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ABSTRACT

The two basic objectives of this five-year study were to investigate a number of variables related to the preparation of effective instructional materials for disadvantaged preschool children, and to determine whether special language instruction would produce improvement in language abilities and thus promote academic progress in the beginning grades. An important by-produce would be a programmed curriculum for the prekindergarten and kindergarten years. The two sections of this report are (1) Report of the Five Year Study, and (2) Comprehensive Evaluation Battery. For Volumes II and III, the total programmed curriculum and the prekindergarten and kindergarten years, see PS 005 702 and 703, respectively. (DB)

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A COGNITIVE CURRICULUM FOR YOUNG CHILDREN

Volume I: Final Report

Prepared at the
Early Childhood Research Center
Carolyn Stern, Director

A five-year experimental research study funded by the United States Office of Education, Contract No. OE 5-85-045, administered through the University of California, Los Angeles.
Carolyn Stern and Evan R. Keislar, Principal Investigators.

1971

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VOLUME 1

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FOREWORD

While there have always been fads in schooling as in dress, never before in the history of education has the pendulum performed such violent gyrations. In the brief period of one decade it has swung from one extreme to another with almost every interval in between maintaining its concurrent coterie of staunch supporters. There have been occasional clashes between the front-runners of a new tide and the entrenched line of the establishment; yet in the past the overall picture has been one of evolution rather than revolution. The ABCedarians of the late 19th and early 20th centuries gave way to the pragmatism of the Dewey-Kilpatrick school. By the 1950's "progressive"had become "traditional" in early childhood education. However, before the end of that decade there occurred several events which had a dramatic impact on the course of education in the '60's.

There had been earlier grumblings from academicians and scholars of the stature of Adler and Hutchins, and from lay critics such as John Keats and Admiral Rickover. Their concern was not so much that the Johnnies from poor families weren't learning how to read, but that the hallowed subjects of the trivium and quadrivium were losing their place as the core of the curriculum for the children of the middle class. The plaint was that the intellectual elite of the future was not being given a sufficiently rigorous immersion in the solid disciplines which constitute the cultural heritage of the human race. Although the buzzing of these gadflies caused some slight irritation, there was no attempt at a critical reevaluation of our educational system until the Soviets launched their spectacular leap into space. Only when the frantic scramble for scientists to man a competitive space program revealed the deplorable lack of qualified personnel did the national government address its full powers to the determination of educational policy.

During this same period, another line of social criticism was beginning to emerge. The first skirmishes in what later became the War on Poverty had identified the inadequate and inappropriate provisions for the education of children from impoverished homes as a major contributing factor in perpetuating the poverty cycle. Since there was considerable research evidence that the first years of life were the most critical, many of the early interventions were with preschool children. In most cases the programs were modeled after the middle-class nursery, where the major emphases were on social-emotional development and creative expression through art and dramatic play. To many investigators it seemed apparent that this approach was not producing the desired remediation; children from compensatory preschools were not measurably improved in their ability to cope with the tasks of the early grades. Structured, academically-oriented programs became the order of the day. Influenced by the Bernstein studies documenting the restricted language of disadvantaged children, many of the new programs focussed specifically on language development.

By the time the National Head Start project was launched, a great variety of conflicting techniques and ideologies had been promulgated, each with its own group of advocates.

A third important impetus to compensatory intervention was related both to the need for specialists for the space industries and the shocking evidence that the traditional educational system had failed to meet the needs of poverty youth. Staggering numbers of 12 and 14 year old children were dropping out of school illiterate, with no vocational skills for economic survival. The Vocational Education Act of 1963 was designed to provide remedial education and job training to this population; but the far-sighted administrators of this legislation were interested in prevention as well as cure. Again stressing the importance of the preschool years in determining the course of later schooling, the proposal for a five-year Preschool Language Project was accepted for funding. The assigned title clearly sets forth the objectives as perceived by the granting agency: Instruction of socio-economically handicapped preschool children in the use of language to increase academic aptitude.

At about the same time, the passage of the Elementary and Secondary Education Act made available additional support for experimental preschool programs; funds were allocated to State Boards of Education, with considerable latitude in their expenditure. Thus, shortly after the present project got under way on June 1, 1965, several preschool alternatives were available to appropriately qualified parents in Los Angeles: The Los Angeles Children's Centers, state-supported but administratively under the Los Angeles Unified School District; the Head Start program under the Office of Economic Opportunity and administered through the various Community Action Agencies of the Los Angeles Economic Youth Opportunity Administration, and Preschool classes housed in regular school buildings under ESEA funding. This unexpected richness of opportunities for disadvantaged young children had serious implications for the implementation of the experimental study. These will be discussed in the report.

Throughout the country, during the five years of this project, there was a similar proliferation of research, demonstrations, and action programs. The pages of ERIC are replete with reports ranging from no-difference findings to phenomenal success stories of 20 to 40 points of I.Q. gains. Generally, however, there has been a growing disillusionment with the lasting effectiveness of preschool interventions. The widely-publicized negative inferences drawn from the Westinghouse study, followed closely by the controversial Jensen article on the modifiability of intelligence, has served to dampen the enthusiasm which had previously prevailed.

While the findings of the present study also failed to fulfill the shining promises made five years earlier, there were mitigating circumstances. Considering the fact that the Children's Centers introduced an academically-oriented curriculum, with small groups given structured learning experiences by a special aide, it is no wonder that the experimental groups did not dramatically surpass the controls. On the credit side, the project did produce many important insights into early childhood learning. Not the least of these was the evidence that a short daily exposure to a special language program which is not integrated into the total preschool experience has little chance to maintain any positive gains. Furthermore, the importance of the teacher's role in fostering the affective components of cognitive learning cannot be underestimated.

The Final Report of the Preschool Language Project is presented in three volumes. Volume I consists of two sections: Section 1 is the Report of the Five Year Study, and Section 2 is the Comprehensive Evaluation Battery. Volume II is the Prekindergarten Curriculum and Volume III the Kindergarten Curriculum.

ACKNOWLEDGEMENTS

As the roster of Project Personnel indicates, many people made diverse contributions to this study. The large number of short term appointments attests to the dual purpose of the project. While there is no question but that the major concern has been the exploration of basic questions related to the facilitation of language development in disadvantaged young children, from the start the training of professional researchers, curriculum developers, and personnel for work in early childhood environments has held a high order of priority.

For most of the graduate students, the work on the project was an important learning experience. In many cases there was a symbiotic relationship: students were able to use the materials they had helped prepare and the data they had collected for the various studies in fulfilling the requirements for advanced degrees. With the undergraduate students the project was frequently only a source of financial assistance while they completed their degrees in other fields. However, the exposure to the satisfactions of working with young disadvantaged children helped many an undecided student reach a decision to pursue a career in this area.

The high rate of turnover necessarily inherent in this policy created many administrative problems; fortunately the dedication of the non-academic staff, and the many votive candles lit by faithful Jen Toscano, helped weather the crises generated during periods of final exams and term paper due dates.

In the final analysis, however, the project would not have had the faintest chance of success without the whole-hearted cooperation of the Children's Centers. Although many other populations and early childhood environments were used in the various comparative studies, the four Centers in which the experimental program was implemented daily, over a period of three consecutive years, provided the basic data for the study. To them, LeMay, Wadsworth, 75th Street, and 52nd Street, and their Head Teachers and staff, goes a sincere acknowledgement of indebtedness. No less important, and perhaps in some ways even more commendable, were the control centers who were over run with testers twice a year but did not have the advantage of the supplementary materials or the assistance of the project monitors during the between-testing intervals. The debt to the teachers at Canoga Park, Miramonte, and 24th Street, and to Normandy, Jordan Downs, and 95th Street, cannot be underestimated.

Without in any way impugning the good will of the staff of the various Centers, the best intentions in the world are meaningless if they are not sanctioned by the powers that be in the Head Office. Dr. Harry Handler, Director of Research for the Los Angeles Unified School District, gave the study his blessing when it was still an embryo proposal, but it was Mrs. Dorothy K. Snyder, Director of the Los Angeles Children's Centers, who played guardian angel throughout the life of the project. Her confidence in supporting the numerous activities of the research was a most precious gift.

While it is difficult to single out specific individuals, three colleagues merit special mention. Mrs. Avima Lombard (who became Dr. Lombard during the course of the study) gave unstintingly of her strength and inspiration through the early years. Dr. Susan Nummedal, while working part time on another project of the Early Childhood Research Center, gave freely of her time to the supervision of the final testing and data analyses in the last phase of the study. And Willa Gupta, who started as a fledgling researcher in the first year and grew through five years of dedication to become a staunch support in every phase of the work.

These were the active participants in this research endeavor. Many others made contributions less direct but by no means less important. In Washington, the Office of Education Project Supervisors, Sue Brett and Lloyd Johnson, accepted all the quarterly progress reports without a single word of criticism, but generously approved the continuation each year. At UCLA, the Deans of the Graduate School of Education, Howard K. Wilson, Erick Lindman, and John Goodlad, expressed their confidence in the Project Director by unquestioning acceptance over the successive years. The administrative staff, Helen Loya, Violet Tomasvary, Ruth Freyer, Raja Desenberg, and many others under the genial supervision of Dean Larry Erickson, handled the volumes of paper work for the ever-changing student staff always with unexceptional competence and good temper.

One final name: Professor Evan R. Keislar, Co-Principal Investigator. What can be said of the man whose creative genius inspired the conceptualization, stimulated every phase of the inquiry, the experimental design, the underlying framework of the proposal? The man who gave the prestige of his name, opened the doors, and then insisted that his junior colleague assume the leadership role. Yet he was always there, when any crisis occurred, ready to provide whatever help was needed. To him these volumes are dedicated: Would they had been more worthy!

PROJECT PERSONNEL[a]

(1965-1970)

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COORDINATOR

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Tobie Gonick (2 1/2 years)
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---

[a] Periods given are approximate; all students on part time

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[b] Many of the undergraduates assisted in these areas.

[c] Data collection and testing only.

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Sergio Perkins
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Jen Toscano (3 years)
Margaret Johnston (2 years)
Mollie Larsen (9 months)
Barbara Locke (3 months)
Karen Todd (6 months)
Sydell Wells (6 months)

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[b] Many of the undergraduate students assisted in this area.

ABSTRACT

The two basic objectives of this five-year study were to investigate a number of variables related to the preparation of effective instructional materials for disadvantaged preschool children and to determine whether special language instruction would produce improvement in language abilities and thus promote academic progress in the beginning grades. An important by-product would be a programmed curriculum for the prekindergarten and kindergarten years.

Although development of evaluation instruments and tests of the various relevant hypotheses continued through all the years of the project, the majority of the work on the first objective was done in the first and fifth years. In planning the overall design of the five-year study, the first year had been set aside for the investigation of certain basic questions: what was the nature of the deficits which existed at this age? what type of cometencies did teachers expect of the kindergarten child? and what types of materials and modes of presentation would be most effective?

Before any assessments or comparisons of advantaged and disadvantaged children could be undertaken, it was necessary to devise a set of criteria on which to base the assignment to socioeconomic status groups. The first product, therefore, was an SES rating scale, based on the Meeker & Harris (1964) census tract indexes plus the occupation of the parent. During the first year eight assessment studies and six experimental studies were carried out. In addition, program segments for the prekindergarten were developed and pilot tested. Over the year, 1600 children in 23 preschool settings participated in the preliminary investigations.

The second objective was expressed in terms of the major hypothesis: Children who are given a two-year program of instruction in language prior to entering first grade will, in comparison with their peers who have received no special language instruction, demonstrate superiority on a battery of tests of language usage when they enter school and in school achievement at the end of their first year of formal schooling, as measured by standard achievement tests.

To test the major hypothesis as well as the curriculum being evolved, the experimental design included both concurrent and successive replications. The successive tests of the curriculum materials were carried out in terms of a First Wave and Second Wave design. During the first year of the major experiment, the First Wave children were given the developing prekindergarten program under carefully monitored conditions, each day's feedback serving as input in setting the next day's program. The modified materials were then presented to the Second Wave of prekindergartners at the same set of experimental sites the next year. Simultaneously, the pilot run of the kindergarten program was tested with the first wave children who continued attending the Children's Centers in the extended day program for working mothers. In the third year, the First Wave children went on into first grade and were tested only at the

end of the year. The Second Wave were given the kindergarten program which had been revised on the basis of the experience with the First Wave children. Also, during this same year the prekindergarten program was used in a comparative study carried out with Head Start children, in a major study at the UCLA Head Start Evaluation and Research Center under Office of Economic Opportunity auspices. The final prekindergarten curriculum incorporated the modifications made as a result of that experiment.

For each Wave, there were concurrent replications at four different Children's Centers, each having a matched control. Only sites with 16 or more children in the four-year-old group were selected; at each of the experimental Centers the same 15 minutes of programmed instruction were presented successively on the same day to groups of four or five children by the same paraprofessional aide or program monitor. At first the children were randomly assigned to the groups, and the groups were called in for the program in random order from day to day. As the monitors became familiar with the different rates of progress of the children at the site, the groups began to coalesce so that the time for the presentation could be more responsive to the needs of the individual children. There were four monitors, each one assigned to a specific site.

All children were pretested at the beginning of the school year; posttesting was initiated at the end of May and continued through the first two weeks of June. During these testing periods an extensive battery of assessment instruments was administered. Standard measures of language and mental ability were used, but the majority of the tests were criterion-referenced, that is, they were designed to measure acquisition of the content of the specific programs. Where possible, pretest scores were used as covariates in the final analysis. The Comprehensive Evaluation Battery is included as Section 2 of Volume I.

The total population for the First Wave was 119, consisting of 71 experimental and 48 control children; the numbers were reduced to 44 and 29 at the end of the first year when many of the prekindergarten class children were admitted into kindergarten in February. This systematic source of attrition was not present for the Second Wave, which started with 112 children, 58 experimental and 54 control; at the end of first year there were still 90 children left. For the final evaluation, there were 34 First Wave and 50 Second Wave children tested. While significant differences were found between the experimental and control children at various checkpoints during the course of the study, by the end of the project there were no significant differences between these two groups, nor between Children's Center children and a new control group in the same first and second grade classes, on the standard reading achievement tests given at that time.

Volumes II and III of the Final Report consist of the total curriculum of the prekindergarten and kindergarten years. Additional products of this project include three doctoral dissertations, eight masters' theses, 16 journal articles, 18 research reports, 23 presentations at professional meetings and 14 workshops or invitational conferences.

SECTION 1

REPORT OF THE FIVE YEAR STUDY

7

CHAPTER 1

INTRODUCTION

Problem

Few people today would dispute the fact that children who spend the first four years of their lives in impoverished homes and on slum streets are at a distinct disadvantage when they enter the average school system. The most obvious and superficial form of deprivation is in terms of the things which money can buy, such as nutritious food, adequate health care, good clothing, proper housing, intellectually-stimulating toys and learning materials, and trips to museums, zoos and other community facilities which contribute so much to the expanded life experiences of the advantaged child. Even more important, the psychological environment in a home which has known only the economy of welfare for several generations is not likely to foster the development of the high press for achievement and goal attainment which is essential for survival and success in the academic setting. Most important of all, however, is the handicapping effect of the restricted language system to which the disadvantaged child has been exposed.

In the past few years, a small group of linguists have taken the position that the language of the subculture of poverty, especially that of the Black community, is a complete system, with its own structure and grammatical rules. Whether or not this is true is quite irrelevant; by the standards of the majority culture, children from disadvantaged homes demonstrate language deficits in three basic areas: listening or receptive comprehension; expressive communication; and verbal mediation. The effect of language impairment is reflected in the inability to follow simple directions and comprehend the meaning of orally-presented information; to express ideas and ask questions; and to utilize language in thinking. This latter category is the most critical for academic achievement, since it is the mediating and categorizing functions of language which facilitate organization of thought and promote problem solving. The language-handicapped child is unable to perform simple linguistic transformations or use those sentential connectives which are the bases of logical operations.

In every area of human endeavor, the ability to use language to formulate and solve problems, even at the simplest concrete or operational level, is of great value. Deutsch (1965) has expressed this very succinctly.

> ...if school is to be effective and these youngsters are not to be discharged into that very large group of unskilled unemployables, then mediating, expressive, and receptive language training should be a conscious part of curriculum organization. You just cannot become a computer technologist unless you can read the instructions and utilize the necessary mechanisms for symbolization and concept attainment. And for this you must have available an elaborate language system with appropriate mediators (p. 86).

More recent support for this position can be found in an article which is generally critical of the deficit hypothesis underlying most intervention programs. Cole & Bruner (1971) present the Deutsch argument in more elegant language:

> If...mastery of the culture depends on one's capacity to perform well on the basis of competence one has stored up, and to perform well in particular settings and in particular ways, then plainly the question of difference in the way language enters the problem-solving process cannot be dismissed...it may very well be that a ghetto dweller's language training unfits him for taking jobs in the power- and prestige-endowing pursuits of middle-class culture (p. 871).

It has been pointed out that the language deficiency of the socioeconomically handicapped child is a cumulative one. Beginning school six months to a year behind his middle-class counterpart, by the fifth grade the disadvantaged child has fallen back two to three years, and by the time he reaches the eighth grade he has achieved a reading level which is considered the norm for the average third grader. The increasing amount of retardation lays the groundwork for a pattern of repeated school failures with accompanying negative affect and subsequent complete alienation from everything the school has to offer. The truant officer may be able to enforce attendance at school, but not attending in school.

The chain which begins with language deficiency quickly leads to failure. This initiates the vicious cycle of failure and censure which ultimately produces impaired self-concept, reducing the expectation of success. With little hope of obtaining approval, alienation and, finally, drop out are logical results. The longer the conditions contingent upon deficiency are permitted to exist, the more difficult does the problem of remedial education become. In addition, it has been demonstrated (Scott, 1962) that during certain critical periods appropriate behavior patterns are established more readily than at a later time. Hunt (1961) notes that to reorganize established patterns is more difficult than the original organization, and Bloom (1964) documents the importance of the early years in the development of intellectual functioning.

All of these considerations point up the necessity for intervention at the earliest possible moment. According to Cole & Bruner (1971), "it is the psychologist's task to analyze the source of cultural difference so that those of the minority, the less powerful group, may quickly acquire the intellectual instruments necessary for success in the dominant culture." (p. 874).

Review of research

There is ample evidence that the scholastic performance of children from middle-class homes is superior to that of the socioeconomically-handicapped, and that the majority of school dropouts come from the latter group. While many independent factors have been identified as contributing to this condition, the most important correlate is language deficiency (Brown, 1964; Bruner, 1961; Dennis, 1960; Deutsch, 1963a, 1964, 1965; Deutsch & Brown, 1964; Hunt, 1961; John, 1963; John & Goldstein, 1964; Katz & Deutsch, 1962, 1963; McCarthy, 1961; Milner, 1951; Skodak & Skeels, 1949, etc.)

Bernstein (1960, 1962) has used the term "restricted" to describe the language of lower-class children, as compared to the elaborated language system of the middle-class child. Restricted language is characterized by simple or incomplete sentences, poor sentence structure, repetitive use of conjunctions, and limited choice of adjectives and adverbs. These strictures are coupled with inability to develop coherent and logical thought sequences over a number of sentences. In contrast, the elaborated language system is characterized by accurate grammatical order, more complex sentence structures, a wider use of adjectives, adverbs, prepositions, and personal pronouns. This richer language lends itself to the complex mediational processes of abstract thought.

The importance of language in cognitive behavior is noted by Bruner:

> ...it is the internalization of overt action that makes thought, and particularly the internalization of dialogue that brings the powerful tool of language to bear on the stream of thought (in Vygotsky, 1962, p. vi).

The ability to use verbal mediators facilitates the formation of concepts by young children (e.g. Birge, 1941; Cantor, 1955; Carey and Goss, 1957; Ervin, 1961; Jenkins and Palermo, 1964; Kendler, 1963; Luria and Yudovitch, 1961; Norcross and Spiker, 1957; Esler and Fivel, 1961; Reese, 1962; Shepard, 1957; Spiker, 1961; Stern, 1964 a & b; White, 1963; among many others). Jensen (1961, 1963) in his work with socioeconomically handicapped Mexican-American children, stresses the importance of verbal mediators and mediational networks in facilitating cognitive functioning. It is here that language deficiency is most critical.

Impaired language functioning has particular relevance in the important academic task of learning to read. Lower-class children are, on the average, inferior in their ability to acquire this skill when compared to middle-class children (Feldmann & Weiner, 1962; Weiner & Feldmann, 1963). The ability to read is perhaps the best predictor of academic success; conversely failure to acquire this skill is a reliable predictor of future dropout.

The correlation between reading impairment and poor performance on perceptual tests has led to the inference that there exists a causal relationship between these two phenomena (Katz & Deutsch, 1962, 1963; Deutsch, 1964; Templin, 1957). Other investigators have found that the ability to shift from one sensory modality to another is also associated with reading ability (Raab & Freedman, 1960). Reading has been related to perceptual inadequacies due to "neurophysiological immaturity" (de Hirsch, 1957) as well as to purely physiological measures, e.g. glucose count and EEG. Reading has also been approached as a process of perceptual learning (Gibson, 1963; Keislar, 1964). The assumed relation between reading ability and perceptual discrimination has led to the inclusion of auditory and visual discrimination practice in many preschool programs (e.g. Feldmann, 1964). However, such activities have not been particularly successful when used in reading readiness programs with normal school populations (Durrell, 1958; Gorelick, 1962).

The question has been raised as to whether cognitive learning activities can be profitably introduced at the preschool level. From the work of Piaget (1961) it has been inferred that young children are not mature enough to perform certain transformations and logical operations. However, Fowler (1962) reports extensive experimental documentation in favor of early cognitive education. And Levin (1964) states that "a good cognitive training sequence would also have as a consequence changes in the children's relations to adults, persistence, work motivation — in short, the attributes we usually think of as character traits" (p. 21).

Recognition of the need for intervention in the early years has resulted in a vast proliferation of preschool programs. Most of the early centers subscribed to what has been called the "mother's knee" approach. The metaphor is used to describe an environment analogous to that of the middle-class home, with the major emphasis on fostering warm and secure relationships with adults, establishing effective social interactions with peers, cultivating curiosity, and enlarging the scope and variety of experiences.

Based on early studies which demonstrated the inadequacy of this approach in remediating the critical deficits of disadvantaged children, a number of researchers (e.g. Deutsch, 1963; Weikart, 1963; Bereiter & Englemann, 1966; Hodges, Spicker, & McCandless, 1969) began to develop cognitively-oriented curricula. With the establishment of Project Head Start in 1965 there came the opportunity for implementing demonstration projects in which a wide variety of theories and procedures in early childhood education could be explored.

ERIC lists an unequalled compendium of references to preschool research, and a number of integrative and analytic reviews of the literature have been funded by the Office of Child Development. For quick reference, Kuzma (1970) and Stearns (1971) can be recommended.

CHAPTER 2

REPORT OF THE FIRST YEAR'S WORK

At the time the present project was funded in 1965, there had been no attempt to determine whether systematic instruction would be effective in reducing the language handicaps of deprived preschool children. Nor were there available suitable materials to implement such a curriculum if its value could be experimentally established. The basic objective of the present investigation was to fill both these lacunae. The projected study would differ from the typical intervention or compensatory preschool approach in that it would investigate the effectiveness of a two-year sequence of programmed language instruction presented to a small group of children in 15-minute segments within the regular daily schedule. Two special requirements were: first the materials should be inexpensive to reproduce and second, paraprofessional community aides would be able to present the program after a brief period of training.

In planning the overall design of the five-year study, the first year had been set aside for the investigation of certain basic questions: what was the nature of the deficits which existed at this age? what type of competencies did teachers expect of kindergarten children? and what type of materials and modes of presentation would be most effective? However, before any assessments or comparisons of advantaged and disadvantaged children could be undertaken, it was necessary to devise a set of criteria on which to base the assignment to socioeconomic status groups. Various types of measures had been developed by Weikart (1963), Brown (1964), and Deutsch (1962), but these required the administration of detailed questionnaires involving home visits and long interviews. In the Los Angeles area, a study which provided an index of socioeconomic status for specific census tracts had just been completed (Meeker & Harris, 1964). After trying out several procedures, it seemed that the best strategy would be to develop a composite rating using this index plus a scaled value for occupation of the parent. In building the latter measure, many standard occupational rating scales were consulted and decisions based on knowledge of the local situation were made. The final SES score thus required only two easily obtained pieces of information: address and occupation. The resulting value was used in designating the SES groups for all the comparative studies.

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The work of the first year is described under three rubrics: 1. Assessment and Evaluation; 2. Experimental Studies, and 3. Program Development.

1. Assessment and Evaluation.

a. Comparative Studies. The first question of concern was to determine to what extent the mental functioning of disadvantaged children differed from that of their more advantaged peers. Two standardized tests were used, the Peabody Picture Vocabulary Test, which has a high correlation with the Stanford-Binet but is less difficult to administer, and the Goodenough-Harris Draw-a-Man Test. The latter measure also has a high correlation with the Stanford-Binet for the average population, but is presumed to be related to motor control, perceptual ability, and understanding of relationships, rather than verbal facility.

These two tests were given to three different groups of children. There were 124 from the Children's Centers, 90 from private nurseries, and 127 from Head Start. It was interesting to find that only the middle class children made similar scores on both the verbal and nonverbal tests. The Children's Center group scored six points higher on the Goodenough than they did on the PPVT, while the Head Start children were, on the average, 11 points higher on the Goodenough than on the PPVT.

In both of these tests, there was a significant difference in ability among the three groups; the beginning Head Start children scored, on the average, 20 I.Q. points below those in the Children's Center program, with the latter group in turn approximately 20 I.Q. points below the children in the nursery school population.

Although it has been established that one of the major deficits of the disadvantaged child is in reading competence, discrepancies in this area can not be tested with preschool children. However, it has long been assumed that beginning reading facility is associated with auditory and visual discrimination skills. Several studies were therefore carried out to determine to what extent advantaged and disadvantaged children differ in these abilities.

In the first study the performance of three age groups (four, five, and six year olds) from private nursery schools on the Wepman Test of Auditory Discrimination was compared with that of the Children's Center group. The results clearly confirmed the superiority of the middle class children. In addition, the latter group showed significant improvement between the fourth and sixth years of age, whereas no similar improvement over age was found with disadvantaged children. This would support the cumulative deficit hypothesis: that is, that there is a progressive decrement such that initial handicaps increase with age.

Because the words used in the Wepman test are ones which are apt to be more familiar to middle-class children, the scores on this test might not be a true measure of auditory discrimination ability. Thus a second study was carried out with both the Wepman and a new test using pairs of nonsense sounds. For this experiment a total of 232 children, consisting of two groups of Caucasian and two groups of Black children within three age groups, were used to sample for race across economic status.

The results again demonstrated that children from poor homes achieved lower scores on the Wepman. However, the Caucasian children in both socioeconomic groupings showed significant improvement over age; this was true only for Black children in the advantaged group. By the age of six, the average Caucasian child from a poor home had caught up with the other group, but the disadvantaged Black child had not. When the nonsense words were used as the basis for discriminating like and different sounds, all the Caucasian children and the advantaged Black children obtained approximately the same scores; however, the Black children from poor homes were significantly below the other three groups. Similar results were obtained whether the examiner was of the same or different ethnic group as the child.

In the process of administering the Wepman it was observed that many children were failing not because they couldn't make the auditory discrimination but because they did not understand the task. When shown a picture of a clown and a teakettle and asked if they were the same, these children were as apt to answer "yes" as when the picture presented two clowns or two teakettles. The difficulty inherent in using a comparison task for assessing discrimination ability led to the development of a different type of auditory discrimination measure.

Another perceptual ability which it seems reasonable to consider important in beginning reading is that of visual discrimination. Again, the only standardized test available, the Frostig Developmental Test of Visual Perception, was found to be inappropriate for use with the disadvantaged children. All the scores were in the lowest 25% as compared to the norming population. A confounding feature of this measure is that all the subtests are highly loaded with eye-motor coordination tasks. A new test to assess visual ability apart from motor control was developed.

Children from poor homes have often been described as less verbal than children from the middle class; furthermore, the language they do use is said to be "restricted" in terms of descriptiveness and flexibility; i.e., to have fewer adjectives, adverbs, and -ing verb forms. To test these assumptions, a verbal output study was carried out with the two populations.

In the Verbal Output study, children were shown five black and white pictures representing different types of scenes. There were two country scenes, a middle class urban scene, an urban ghetto scene, and a picture of a typical zoo. The children were asked to describe the picture, and then to make up an appropriate story. All the words produced by the child, except conjunctions and hesitations, were recorded and analyzed both in terms of total output and in the variety of words for each picture. The relationship between these two measures was so close that only the total output scores were used for the final analyses.

It was found that disadvantaged Caucasian children and advantaged Black children produced a great many more words to describe these pictures than did advantaged Caucasian and disadvantaged Black children. Also, the advantaged Caucasian and disadvantaged Black children were similar in their part-of-speech usage patterns as well as in total verbal output. They used a large percentage of nouns (about 60% of total output) and comparatively few pronouns, adverbs, adjectives, and prepositions. The proportion of -ing verb forms compared to total verb output was much higher than with the other two groups.

With reference to the content of the pictures, no evidence of group differences were found. For some unknown reason, all children had considerably less to say about the zoo picture than any of the other scenes.

The results of the verbal output study seem to indicate that when children from poor homes are given materials which they find interesting and meaningful they can talk about them quite as fluently and expressively as children from advantaged homes. Perhaps their diction is not as precise and their sentence construction will win no prizes in grammar, but they are certainly willing and able to communicate through the use of language.

To determine the nature and extent of the vocabulary children need to be familiar with when they enter kindergarten, two quite different approaches were used. First a thorough and exhaustive study of a wide variety of word-lists, work books, readiness tests, and mental ability tests was carried out. All these words were listed and tabulated as to frequency of occurrence. From these the 125 most common were selected and made the basis of a new vocabulary test.

The second approach was to record and analyze the language used by a variety of kindergarten teachers. Teachers in schools drawing upon different types of populations were sampled, and the Flander's system for analyzing teacher speech was used. There was some slight indication that teachers working with children in poor neighborhoods were apt to be more directive in their teaching. They made more statements of fact and ask more specific questions compared to teachers of advantaged children.

As a result of this survey, it was possible to identify a number of important speech patterns children are expected to understand when they enter kindergarten; these were made part of the language pattern practice units.

The sixth assessment study was an attempt to determine the effectiveness of different types of reinforcers for these two populations. Is it true that children from poor homes work harder for concrete rewards, and that they are not as apt to work simply for the praise and approval of the teacher? In designing this study, five conditions were used. These were: candy for the correct response, nothing for a wrong one; candy for the correct response and a reprimand for the wrong one; praise for the correct response and a nothing for the wrong one; praise for the correct response and a reprimand for the wrong one; and finally, no praise or punishment of any kind.

The materials consisted of three books of approximately 30 pages with two pictures on each page. All the pictures had been previously shown to a similar group of children, and only those which could be correctly identified by 95% of the children were used in the study. The task was for the child to point to the picture described by the experimenter. Since the pictures were familiar ones, all children were expected to make a correct response. To obtain an equal number of incorrect responses, which were necessary to determine the effect of reprimand, 60 of the 184 individual pictures were given nonsense names. Then, regardless of which picture the child selected, he was told he was correct or incorrect according to an established schedule.

On the whole, children from poor homes were apt to stay longer with the task than children from advantaged homes. When these groups were further classified on the basis of race, it was found that the Caucasian advantaged children and the Black disadvantaged children tended to remain slightly longer, reagrdless of the type of reward being used. The Caucasian children from poor homes seemed to be highly motivated by candy reward, with very poor performance in the other four conditions. This was the opposite of what was found with the Black children from poor homes, for whom candy had little appeal, but all the other conditions proved highly motivating. There was so much variation within the groups that differences in the conditions could not be considered reliable. However it is safe to say that the experiment demonstrates that children from poor homes are motivated in just about the same way as children from middle-class homes, and that they will stay and work when the tasks are interesting and when they are given a good chance for success.

b. Development of New Evaluation Instruments. In the course of the various assessment studies, the inadequacy of the measures available for disadvantaged children quickly became apparent. Construction of more appropriate tests were begun during this first year. Over the course of the study five instruments were developed:

- Children's Auditory Discrimination Inventory (CADI)
- Expressive Vocabulary Inventory (EVI)
- Echoic Responding Inventory for Children (ERIC)
- Visual Discrimination Inventory (VDI)
- Parallel Sentence Production Test (PSPT)

These tests have been listed in the Educational Testing Service Test Bulletin and numerous requests for them from colleagues have been received. Several large scale research studies have used one or more of the measures in their evaluations. Miller & Dyer (ED 045 196, 1970), in a comparative study of curricula in Head Start and Archambo & Briscoe (ED 055 681, 1970), in their study of a multi-county Rural Child Care Project, are only two of hundreds of early childhood evaluations which have used these instruments.

2. Experimental Studies.

A number of methodological and learning questions needed clarification before specific decisions with regard to the instructional materials and procedures could be made. There was a fundamental question as to whether a young child would be able to use and profit from instructional programs.

Holland (1962) reported a high degree of success with an instructional program in teaching inductive reasoning to six and seven year old children. Keislar and McNeil (1961) demonstrated that a good proportion of first grade children were able to learn verbal generalizations and to solve problems relating to science after a three-week instructional program. Other studies (Keislar, 1959, 1961; Keislar & McNeil, 1962; Hively, 1962; Anderson, 1964) also support this position. An auto-instructional program in successive discrimination for the primary grade level was developed at Michigan (Smith & Kelingos, 1964). Salzinger, et al (1962), have demonstrated that the oral language production of children is definitely implemented by practice under reinforcing conditions. However, none of these studies had been carried out with preschool age disadvantaged children. Five studies bearing on related issues were carried out during the first year.

Two-dimensional vs. three-dimensional materials.

Most teachers of young children feel it is very important to have children use a wide variety of sensory modalities. Touching, smelling, feeling, handling, are thought to make major contributions to the young child's understanding of the world in which he lives.

While it is not impossible to prepare programs which use three-dimensional objects, such materials create housekeeping problems for the teacher. To warrant their use in the program they would have to demonstrate considerable superiority over two-dimensional pictures, which are much easier to fit into a programmed format and to take care of in the classroom.

The experiment designed to throw some light on this question used, for one treatment, a metal doll house, two bendable rubber figures, and a full-sized door knob with a lock and key mounted on a small door attached to a frame with a pair of hinges. The second group of children saw pictures which had been drawn of these very objects. The verbal commentary which accompanied both types of material was identical. The instructional program concerned a boy who was learning about the various parts of the house in which he lived. The program was presented in two segments, each of which was expected to take approximately 12 minutes.

Twenty-five boys and twenty-five girls from the Children's Centers took part in this experiment. The results demonstrated that all the children gained a great deal from the program. However, these gains were just about the same with both sets of materials. The three-dimensional objects did not produce superior learning, they were more difficult to use, and took more time to present. The children were interested in playing with the house and the other objects, but did not readily settle down to learning the verbal concepts the program was designed to teach.

The development of verbal fluency: Pattern-practice vs. story context.

The purpose of this experiment was to determine which of these two methods was more effective in getting children to form complete and grammatical sentences. Two programs were constructed, each requiring five days, with an additional two days for pre- and post-testing. The daily lessons contained up to 90 individual items and lasted approximately 12 minutes. Three types of responses were called for: echoing the sentence of the examiner, pointing to the object described, and producing the appropriate sentence for a selected picture.

In the pattern-practice treatment the sentences were carefully sequenced and presented in order of grammatical difficulty. This led to a regular routine of responding with the same sentence form but altering only one element, subject, object, or verb. The story treatment used many of the same sentences when they were appropriate for the story content. However, to maintain the story, the pattern of repetition had to be altered, a number of bridging sentences which required only a listening response were introduced, and the number of occasions for echoing the structured sentences was decreased so that the total time would be the same for both treatments.

The results showed that the structured repetition of the sentences in a pattern-practice fashion produced considerably more learning than the story form. This improvement carried over from the material with which they were trained to new and different types of pictures. Contrary to expectation, the story form did not seem to keep the children any more involved than the more formal pattern-practice. Evidently the fact that the beginning sentences were within their ability level, and that they were gradually brought to where they could produce more and more complex sentences, was sufficiently rewarding to keep the children interested in this sentence production training.

Sentence production training: Echoing vs. modelling.

Another approach to the improvement of language production was one which compared an echoing with a modeling procedure. Both treatment groups were given the same four day program, each day consisting of approximately 16 different pairs of pictures. With one group, the experimenter presented the sentences which described the two parallel pictures. For instance, a picture of a pear was shown and the experimenter said: "This is a pear." Then the picture of an apple was shown and the experimenter said: "This is an apple." The children were asked to repeat the sentence after the experimenter. This procedure was followed for all the items in the program, using a variety of sentence structures. The test required the child to produce the sentence to some of the same pictures, as well as to some new pictures, without the experimenter's help.

In the second treatment the experimenter would show the pear picture and say: "This is a pear," and ask the child to repeat that sentence. Then the child would be shown the picture of the apple and asked: "Now you tell me about this picture." While this procedure gave the child only half as many models to echo, it did give him the experience of having to produce his own sentences.

While little difference was found between these two methods, the double-echoing procedure produced better results with the children who had the lowest scores on the pretest.

Sentence production training: The value of the spoken response.

Closely related to the previous study, this experiment attempted to find out whether children who are asked to speak out loud during a learning program will improve their ability to produce good sentences more readily than children who are given an opportunity to listen to the correct sentences. This study used the same pictorial materials which had been used in the experiment with pattern-practice vs story context. Since, the pattern-practice had proven so much more effective, only this procedure was used. The treatments differed in that in one case the children heard the experimenter say each sentence twice, and in the other, the experimenter said the sentence, and the child was asked to repeat it.

Both methods were equally effective. The advantage of the group which was given the opportunity to practice producing the sentences, often incompletely or incorrectly, seemed to be offset by the fact that the listening group was given the opportunity of hearing the correct form twice and had fewer opportunities to produce incorrect sentences.

Concept learning: Random vs. ordered sequences.

This study asked the question of how important it was that instructional materials be carefully presented in a logical order. The earliest programmers were very concerned that instructional programs should develop the concepts and content of a subject in a very orderly manner. More recently the necessity of such a procedure has been questioned, at least with older learners.

Five concepts were selected for teaching in this experiment. They were: clothing, transportation, animals, furniture, and parts of the body. Five examples of each concept were provided. For each example the child was required to respond to four questions: What's this?; What do you do with it?; Where do you find it?; and a nonsense situation demonstrating the instance of the concept in an inappropriate setting, as, for instance: Can you brush your teeth with a couch?

The instructional program took five days, with one concept presented per day. The treatments differed in that the ordered presentation followed the same sequence of questions for each example, whereas the random treatment presented all the same items but in a completely scrambled fashion. Thus, a "What's this?" question concerning the picture of the couch could be followed by a "What do you do with it?" question about a truck.

The results demonstrated that the children were able to learn these concepts sufficiently well so that they could use them with new examples. However, contrary to the expectations of the experimenter, the amount of learning was not related to the type of program presented.

3. Program Development.

During the last quarter of the first year the major activity was the development of materials for the First Wave of the experiment. Language development in the entire prekindergarten involves the total curriculum, that is, it focuses on the acquisition of the verbal labels through which the various subject matter concepts are conveyed.

Conversely, it would be impossible to design a language program completely divorced from subject matter content. Thus, a 30-week sequence in instruction was constructed around six major subject matter areas: science, mathematics, social studies, literature, language usage, and logical processes.

With the cordial cooperation of 23 early childhood centers, over 1600 children participated in the studies carried out during the first year of the investigation.

CHAPTER 3

DESCRIPTION OF THE STUDY

Objectives and Hypotheses

The two basic objectives of this research study were first to investigate a number of variables related to the preparation of effective instructional materials for disadvantaged preschool children, and second to determine whether special language instruction would produce improvement in language abilities and thus promote academic progress in the beginning grades. An important by-product of the research project would be the development of a sequence of programmed learning units for the prekindergarten and kindergarten years.

The first objective was implemented by the individual research studies summarized briefly in Chapter 2. Detailed reports of these investigations are listed in the Appendix to Volume 1. Many of them have been published in professional journals or as ERIC abstracts.

The second objective was expressed in terms of the major hypothesis: Children who are given a two-year program of instruction in language prior to entering first grade will, in comparison with their peers who have received no special language instruction, demonstrate superiority on a battery of tests of language usage when they enter school and in school achievement at the end of their first year of formal schooling, as measured by standard achievement tests.

In the original proposal the plan had been to test this hypothesis with matched samples of advantaged and disadvantaged children. However, in the exploratory work carried out during the first year it became clear that it would be impossible to locate an appropriate group of advantaged children. While there was some overlap between these two populations, no one preschool could be expected to have a sufficient number of eligible advantaged children to constitute both an experimental and control group. Furthermore, when the proposal was written since Head Start had not been anticipated, the disadvantaged population designated was that of the Los Angeles Child Care Centers. These Centers had been established during the period of World War II, and were designed primarily to provide custodial care for children of working mothers. Even during the first year of the study, the program at these Centers contained very little cognitive input. Just before the investigation got under way, there was an important shift in emphasis from the "care" component to a somewhat structured preacademic curriculum. So basic was this change that the "Child Care Centers" dropped "Care" and became the "Children's Centers".

Under this new orientation it was impossible to obtain a matched control group who received custodial care without cognitive instruction. It was decided to proceed with the study, recognizing its high-risk quality, with the hope that, even if no differences were found between the experimental and control groups in the Children's Centers, the intervention would demonstrate the value of the programmed language curriculum by bringing the performance of the disadvantaged children up to the level of the average kindergarten or first grade child. Also, the development of the programmed curriculum for this age group, originally conceived as a by-product, would become a major contribution.

Experimental Design

To test the major hypothesis as well as the curriculum being devised, the experimental design included both concurrent and successive replications. The successive replications of the curriculum materials were carried out in terms of a First Wave and Second Wave design. During the first year of the major experiment, the First Wave children were given the developing prekindergarten program under carefully monitored conditions, with each day's feedback serving as input in setting the next day's program. These modified materials were then presented to the Second Wave of prekindergarteners at the same set of experimental sites. Simultaneously, those First Wave children who continued attending the Children's Centers in the extended day program for working mothers were given the pilot run of the kindergarten program. In the third year the First Wave children went on into first grade and were tested only at the end of the year. The Second Wave were given the kindergarten program which had been revised on the basis of the experience with the First Wave children. Also, during this same year the prekindergarten program was used in a comparative study carried out with Head Start children, in a major study at the UCLA Head Start Evaluation and Research Center under Office of Economic Opportunity auspices. The final prekindergarten curriculum incorporates the modifications made as a result of this experiment.

For each Wave, there were concurrent replications at four different Children's Centers, each having a matched control. Only sites having 16 or more children in the four-year-old group were selected; at each of the experimental Centers the same 15 minutes of programmed instruction were presented successively on the same day to groups of four or five children by the same paraprofessional aide or program monitor. At first the children were randomly assigned to the groups, and the groups were called in for the program in random order from day to day. As the monitors became familiar with the different rates of progress of the children at the sites, the groups began to coalesce so that the time taken for the presentation could be more responsive to the needs of the slower children without imposing repressive delays and repetition on those who learned more quickly. There were four monitors, each one assigned to a specific site. As far as the children were concerned, and even many of the teachers, they were accepted as part of the regular staff. Although the monitors were also used in the evaluation, they never tested at the site where they were program monitors.

All children were pretested at the beginning of the school year; posttesting was initiated at the end of May and continued through the first two weeks of June. During these testing periods an extensive battery of assessment instruments was administered. Standard measures of language and mental ability were used, but the majority of the tests were criterion-referenced, that is, they were designed to measure acquisition of the content of the specific programs. Where possible, pretest scores were used as covariates in the final analyses.

In addition to this type of summative evaluation, the fifth day of the week was set aside for assessing the progress of the children through the various units of instruction. When only a few of the children failed to acquire the concepts, remedial sessions were provided; however, when the majority showed lack of comprehension, program revisions were made.

Because a high rate of attrition could be expected in this transient, metropolitan area, a method for obtaining alternates had been suggested in the original proposal. This proved to be completely impractical. The sequential nature of the program meant that each successive unit presupposed the acquisition of skills of the preceding one. Thus it was impossible to bring new children up to criterion in a few short training sessions. Also, children who had started with the program but had been absent for two or three weeks could not always be returned to the experimental group. Whenever possible, they were given make-up sessions on an individual basis at the same time that they continued learning new materials in the group context.

While it would be interesting to be able to relate performance to attendance and continuity in the program, the great variety of patterns and the small number of replicates in each situation would provide little more than a series of anecdotal and circumstantial reports. Since almost all children were absent at some period over the course of their participation in the study, no special provisions were made to partial out the effect of varied attendance. Children were posttested and included in the final analyses only if they had been present 60 percent of the time (that is three of the five days each week) that programs were given.

Subjects

It is a moot question whether it is better to maintain an experimental and control treatment within the same site, thus chancing contamination, or to randomly assign treatments to sites with similar populations, recognizing the possibility of large between-site differences. Fortunately or unfortunately, no decision on the merits of these two alternatives had to be made since there was only one Center with a large enough population of prekindergarten children to provide both a control and an experimental group. With the assistance of the Director of the Children's Centers, three pairs of matched sites were identified. In the San Fernando Valley area, two sites in which the children were Caucasian were paired; two other pairs of sites were in the primarily Black area of Central Los Angeles. Within each pair, one site was randomly assigned to the experimental and one to the control treatment. For the first year of the experiment, i.e. the "First Wave", a seventh site, the only one with the requisite number of children, provided the fourth replication. At this site the children were randomly assigned to either experimental or control condition. However, during the year it became apparent that it was impossible to prevent a great deal of diffusion; there was considerable spillover from the children receiving the instruction to the so-called control group. Thus for the Second Wave of the study this site continued to provide the experimental group but matched controls were obtained from three other Children's Centers in the same area.

Table 1 provides the statistical data for the participants in both waves of the investigation. The unusually large attrition in the first year of the first wave was due to the fact that the Los Angeles school system opened enrollment for beginning kindergarten in February, so most children old enough to enter kindergarten at mid-year were lost to the research study.

The total population for the First Wave was 119, consisting of 71 experimental and 48 control children; the numbers were reduced to 44 and 29 at the end of the first year. The mean pretest chronological age (in months) of the original group was 48.9, whereas, the mean pretest C.A. of those who remained throughout the first year was 43.9, reflecting the loss of the older children.

This systematic source of attrition was not present for the Second Wave, which started with 112 children, 58 experimental and 54 control; at the end of the first year there were still 90 children left.

TABLE 1

COMPLETION DATA FOR CHILDREN IN FIRST WAVE

	Experimental Groups					Control Groups				
	1	2	3	4	Total	1	2	3	4	Total
Sept. 1966	19	18	16	18	71	9	11	12	16	48
June 1967	13	9	11	11	44	7	6	7	9	29
Sept. 1967	11	4	11	10	36	2	6	5	9	22
June 1968	11	5	9	8	33	2	7	7	8	24
June 1969	10	6	3	8	27	3	6	6	7	22
June 1970	7	2	4	5	18	1	6	4	5	16
Attrition	12	16	12	13	53	8	5	8	11	32

SECOND WAVE

Sept. 1967	15	14	16	13	58	17	9	10	18	54
June 1968	15	13	13	9	50	12	5	9	14	40
Sept. 1968	12	10	8	11	41	9	4	9	11	33
June 1969	12	11	11	9	43	7	4	7	10	28
June 1970	5	8	8	8	29	2	7	6	6	21
Attrition	10	6	8	5	29	15	2	4	12	33

Instructional Program

Volumes II and III of this Final Report provide the detailed lesson outlines for the total curriculum of the prekindergarten and kindergarten years. However, these represent the final products of many stages of development, try-out, revision. Table 2 permits a comparison of the content of the programs given to the First and Second Wave children over the four semesters.

The sequence of instruction combined a programming format with a linguistic theoretical framework. Using a "pattern practice" technique (Politzer, 1960) to teach children to produce complete sentences, sequences were arranged in order of increasing structural complexity. Similarly, children were taught to supply substitutions in already acquired patterns of language usage, to use simple transformations (e.g. interrogative to declarative, nouns to pronouns), and other linguistic competencies which the average young child learns before he is six years old (Berko, 1960). Standard pronunciation was also taught in the pattern practice format. Fries (1963) has identified this skill as an important precursor of learning to read.

A useful way of approaching the development of language in cognition is to be found in mediation theory. Jensen (1961, 1963) has indicated that disadvantaged children have difficulty in forming concepts because of their inadequate use of verbal mediators. The role of language as a self-stimulator or mediator has been shown by Kendler & Kendler (1963) to be central in problem solving processes. This is especially critical between the ages of four and seven during which period the ability to use mediators in reversals and other cognitive operations first emerges. These verbal mediators act as building blocks in the acquisition of knowledge, as described by Gagné (1962). The language curriculum attempted to establish the necessary verbal prerequisites for future learning in the form of an hierarchy of language skills which these children must acquire in order to profit from instruction in the first grade.

After the pretesting had been completed, the Project Monitor assigned to the site presented the orientation program, the "Language of Instruction." In this two-week sequence the children were taught to respond to mands such as "look," "point to," "find," etc. They were also given opportunities to listen to and identify sounds, label pictures, and "read" picture stories. A unique feature of this introductory program was that it provided a bridge from a set of three-dimensional materials to two-dimensional, artist's renderings of these very same items.

Table 2

Number of Lessons by Content Area
for Prekindergarten and Kindergarten Years
for First and Second Wave Studies

	First Wave				Second Wave			
	Semester				Semester			
	1	2	3	4	1	2	3	4
1. Language of Instruction	10	-	1	-	7	-	-	-
2. Language Modeling	14	13	6	3	11	12	16	12
3. Picture Reading	-	-	-	-	7	-	-	-
4. Nursery Rhymes	-	6	1	-	6	-	-	-
5. Reading	-	-	34	23	-	-	35	34
6. Opposites and Rhyming[a]	-	8	6	-	-	3	-	-
7. Color	19	2	3	-	14	6	-	-
8. Puzzles	-	7	-	-	11	-	-	-
9. Number, Color, Shape Review	-	-	-	1	1	1	-	-
10. Numerals	14	14	17	15	23	21	3	-
11. Math - Science	-	-	-	-	-	-	22	29
12. Logic	-	-	-	11	-	-	-	14
13. Matrix	-	-	6	9	-	-	15	3
14. Social Studies	-	-	-	-	-	-	9	6
15. House & Animal Homes	8	4	-	-	6	6	-	-
16. Family Relationships	-	12	-	-	-	12	-	-
17. Categories	3	4	-	-	-	7	-	-
18. Sequencing	-	1	3	5	5	6	-	8
19. Problem Solving	10	4	-	-	5	14	-	-
Total Lessons	78	75	77	67	96	88	100	106

[a] First Wave only

In the second week of this unit, the children learned to listen and respond to commentary on magnetic tape and became familiar with the materials which they were to use in various phases. The introductory sequence worked so well that it was retained without modification for use with the Second Wave. Table 3 gives a detailed picture of the total number of programs to which each child in the latter group was exposed. Similar data is available for the First Wave children but has not been included since the analyses do not reflect attendance.

One of the principal modes of presenting the programmed instruction utilized a chemical feedback system. Early in 1965, the A.B. Dick Company had developed a special "magic" mimeograph ink which was made available to the project on an experimental basis, without cost. Water-soluble, non-toxic pigment in various colors was inbedded in the oil-based mimeo ink. When material was printed with this ink it could not be distinguished from the text in black ink. However, when the critical area was moistened with a water-filled pen, the water-soluble color was released. While this special ink was used in many ways, and in many colors during the project, it was most frequently applied in half-inch circles under a set of alternatives; for the correct item the pigment was green and for all the incorrect ones it was red. Children learned to indicate comprehension of various types of concepts by selecting one of the alternatives. Frequently the children were given problems in which there was no way of knowing the correct answer except by using the circle to "ask the question." At all times great care was taken to avoid using feedback for approval or disapproval. Children were told that green indicated the correct picture and red the incorrect picture, rather than that they were right or wrong. There was a conscious attempt to teach children to profit from negative as well as positive instances, a type of information-processing which is lacking even in many college students.

Once the children had learned to make the various types of responses they were able to move into the actual content units. Each daily presentation took approximately 15 minutes and usually included two different types of responding. In addition to the feedback booklets, a wide variety of materials were used to maintain interest. Listening centers in which each child had his own tape recorder were set up, and each child was able to listen to a short story, record his version of it, and then play back his own voice telling the story. An automat-type puzzle box capable of dispensing a sequence of five picture puzzles in a predetermined order was developed. Although these boxes could be used with commercial puzzles, they were used in the program to present the puzzles designed to teach geometric concepts.

Table 3

Number of Lessons within Each Content Area[a]
Received by Individual Children during Two Program Years

	Content	1	2	2	3	4	5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	18	19
Child#	Year	1	1	2	1	1	2	1	1	1	1	1	2	2	2	2	2	1	1	1	1	2	1
037141		7	19	23	4	5	59	2	17	8	2	34	3	43	13	14	12	11	8	7	10	8	18
131		7	21	23	7	5	53	3	19	9	2	38	2	41	11	15	9	12	10	7	11	4	18
132		7	19	27	7	6	66	3	20	9	1	44	2	47	12	16	13	12	12	7	11	8	19
124		7	19	23	7	6	65	3	20	9	2	43	3	48	13	16	13	12	12	7	11	7	19
133		7	20		6	5		3	17	9	2	39						11	9	7	11		17
134		7	18		7	4		3	19	11	2	37						10	11	7	11		17
140		7	20	25	6	5	61	3	18	10	2	41	2	44	13	16	10	9	10	7	10	5	17
138		7	21	24	7	6	66	3	18	10	2	43	3	48	12	18	14	12	12	7	11	8	19
125		7	19	23	6	5	56	3	20	10	1	41	3	42	9	15	9	10	10	7	11	3	19
128		7	21	22	5	6	60	3	18	9	2	40	3	47	12	17	10	9	10	7	10	7	18
139		7	20	25	7	5	64	3	18	11	2	43	3	46	12	17	12	12	19	7	10	6	18
136		7	22	26	6	6	65	3	20	10	2	44	3	48	13	17	14	12	11	7	11	8	19
044117		7	22		7	5	[illegible]	3	20	11	2	44						12	12	7	10	5	19
118		7	20	24	7	6	63	2	20	10	2	43	3	49	14	18	13	11	10	7	11	8	18
119		7	23	24	7	6	65	3	19	11	2	44	2	51	14	18	15	11	11	7	9	7	19
120		7	23	24	7	6	65	2	20	11	2	44	3	47	13	17	13	11	12	7	11	7	19

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[a] For description of content area number see Table 2.

Table 3 (Continued)

	Content	1	2	2	3	4	5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	18	19
Child #	Year	1	1	2	1	1	2	1	1	1	1	1	2	2	2	2	2	1	1	1	1	2	1
044034		7	19		6	5		3	18	10	2	41						11	10	7	11		19
035		7	19		7	5		3	16	10	2	39						10	12	7	11		19
121		7	21		7	6		3	19	10	2	44						11	12	7	10		19
122		7	23		7	6		2	19	10	1	44						12	12	7	10		18
123		7	21	28	6	6	68	2	19	10	2	43	3	49	14	18	15	12	12	7	10	7	17
045		7	23	24	7	5	65	3	20	11	2	44	3	47	14	17	13	12	11	6	11	7	18
125		7	22	28	7	6	65	2	19	11	1	44	3	49	14	17	15	10	12	7	11	8	17
128		6	18		7	6		3	17	11	1	41						12	12	7	11		19
129		7	19	28	7	5	69	3	20	10	2	43	3	51	14	18	15	11	10	6	11	8	19
130		7	19	26	6	6	65	3	17	10	2	40	3	47	13	17	12	11	10	7	8	8	19
054061		7	7	23	4	3	61		10	8		16	3	45	12	15	12				5	7	4
062		7	21	25	6	6	60	3	20	10	1	44	3	45	12	13	14	12	12	7	11	8	19
063		7	21		7	6		3	20	10	2	44						12	12	7	11		19
065		7	18	23	7	5	61	2	20	10	2	43	3	43	13	13	14	12	11	7	10	7	18
066		7	10		7	6			14	7	1	22						6			5		5
058		7	16	25	7	5	59	1	19	10	1	40	3	44	13	14	13	12	9	6	9	8	11
067		6	17	25	6	3	58	2	18	6		35	3	44	13	16	13	10	10	6	6	8	11
068				13			29						2	18		10	4						
055		7	20	27	7	4	60	3	19	9	2	41	3	41	12	15	14	12	12	7	11	7	18

Table 3 (Continued)

	Content	1	2	2	3	4	5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	18	19
Child #	Year	1	1	2	1	1	2	1	1	1	1	1	2	2	2	2	2	1	1	1	1	2	1
054070		7	11		7	5			14	9	2	21						5			5		5
071		7	16	15	6	6	30	2	20	10	2	38	3	19		13	9	11	8	7	9		17
072		7	22	27	7	5	61	3	20	10	2	43	3	46	14	15	15	12	11	7	9	7	18
057		7	20		7	4		2	20	9	2	43						12	9	7	11		19
073		7	19	25	6	6	59	3	20	10	1	42	3	44	14	15	15	10	12	7	11	7	18
031138		7	20		6	5		3	19	11	1	38						10	10	7	11		17
139		7	20	13	7	6	65	3	20	10		41	3	49	14	15	14	12	11	7	11	7	19
136		7	21	26	7	6	65	3	20	11	2	43	3	49	14	15	13	12	11	7	11	8	19
140		7	21	25	7	5	65	3	20	11	1	42	3	50	13	14	15	12	10	7	11	8	19
141		7	19	11	7	6	34	3	19	10	1	41	3	27		13	9	11	10	7	10	1	18
142		6	19	11	7	6	61	3	19	11	2	39	3	48	14	14	12	10	9	7	11	8	16
143		6	19	24	6	5	63	2	18	11	2	37	2	48	14	16	15	10	10	7	10	8	16
137		5	14	24	4	4	59		17	10		31	2	47	12	14	12	9	4	5	6	6	10
144		7	23	27	7	5	66	3	20	9	2	44	3	49	14	15	13	12	11	7	11	7	19
145		7	21	26	6	4	65	3	19	10	2	41	3	47	14	12	11	11	10	6	11	8	19
146		7	21	26	7	6	62	3	20	9	2	40	3	48	14	17	11	12	11	7	11	8	18
147		7	23	25	7	6	67	3	20	11	2	42	3	44	13	18	12	12	11	7	11	8	19
149		7	23		6	6		3	20	11	2	40						12	11	7	11		19
150		7	21	13	5	5	31	2	17	10		38	2	25		14	8	10	9	6	9	1	17
151		5	17		5	3		1	15	8		33						9	8	5	8		14

Familiar games such as lotto, old maid, snakes-and-ladders, and "Go fish!" were adapted to carry the instructional content, and matrix boards were used to teach both categorization and sentence production skills. In all of these activities the monitors were given precise instructions so as to maintain replicability; whenever possible the directions were recorded on magnetic tape and duplicated for use in each site.

These structured language programs occupied a very small portion of the child's day at the Center, which usually consisted of eight or more hours. Thus there was amply time for children to engage in all the traditional preschool activities including art, music, dramatic play, etc. In addition, the language program provided a "high-intensity" learning experience. Each child was given what amounted to individual instruction, he was required to respond to every question, and was given immediate information as to the correctness of his response. Other characteristic features of programmed instruction included the clear statement of objectives in terms of terminal behavior, and the sequencing of the items and lessons so that there was a progressive relationship from one frame to the next and from unit to unit.

Criterion Measures

Upon entering the program, all the children were given the Peabody Picture Vocabulary Test and the Goodenough Draw-a-Man Test. In the first year half of the children in the sample were also tested with the Stanford-Binet. This is an expensive test to administer, and since it had no particular advantages for this study it was dropped from the test battery. The Metropolitan Achievement Test and the Stanford Reading Test were given at the end of the first grade, and the Cooperative Reading Test at the end of the second grade. In addition, appropriate subtests of the Comprehensive Evaluation Battery, described in detail in Section 2, were used at various stages.

CHAPTER 4

RESULTS AND CONCLUSIONS

A great deal of data was collected over the five years of the project. Much of this information has already been disseminated in the various reports of individual studies; in storage are hundreds of booklets which could provide the basis for many more. Limitations of time and funds prevented the full exploration of this mine of information. However, the gross analyses which were done gave some indication that the pay load might be very meager. In several studies with Head Start data, attempts were made to relate change scores to attendance, with no appreciabe success. Other types of data were used during the formative process and the findings have been incorporated in decisions relative to modes of presentation and development of materials.

The pretest data for the First Wave are given in Table 4a and 4b. In the first are the scores for the total group, the experimental, and the control, on the major subtests; the second reports the scores on the same measures for the matched experimental and control classes. It should be noted that the first paired set (1E and 1C) refer to the two sites where the children were all Caucasian.

Although within pairs sites were randomly assigned to either the experimental or control condition, there was a slight tendency for the control group to obtain somewhat higher scores on the Binet and the PPVT. However, on the Goodenough, as well as all the other measures, there were no significant differences between the two treatment groups.

Because of the unexpected attrition which occurred when many of the prekindergarten children were allowed to enter kindergarten at midyear, several new children had been brought in to serve as replacements. Thus Table 5 presents the posttest scores for 73 children tested at the end of the first year (by site and treatment) whereas Tables 6a and 6b report only 67 children, i.e., those who received both the pre- and posttest. Both of these tables report the pretest, posttest, and adjusted means for each of the tests administered. The adjusted mean was obtained from the BMD 04V computer program, which computes a one-way analysis of covariance.

There was a great deal of work done on the test battery after the feedback from the pretesting sessions had been collated. In many cases these remarks were minor criticisms having to do with the art work, or the clarity of the pictured concepts. As far as possible, modifications which did not appreciably alter the original subtest were made. Although in a few subtests the number of points assigned to pre and posttests varied, the pretest was still used as a covariate since the changes affected the performance of all children equally.

Table 4a. Pretest Data on Original Population (First Wave)

N	Total Group 119			Experimental 71			Control 48		
Variables	Mean	S.D.	Range	Mean	S.D.	Range	Mean	S.D.	Range
Age (Months)	48.9	2.6	42-56	49.2	2.4	44-53	48.5	2.8	42-56
Mental Age-Binet	48.6	6.9	30-63	47.9	6.4	30-63	49.4	7.4	30-59
Peabody	43.3	11.2	22-80	42.6	11.0	27-80	44.3	11.6	22-70
Goodenough	49.1	11.0	36-78	49.2	11.7	36-78	48.9	10.0	36-69
Expressive Vocabulary	25.2	5.2	15-39	25.1	5.4	15-39	25.2	4.9	15-35
Auditory Discrimination	28.5	5.0	10-38	28.0	5.2	10-37	29.3	4.6	21-38
Echoic Responding	12.8	3.6	2-19	12.8	3.4	2-18	12.9	3.8	2-19
Visual Discrimination	28.3	7.2	0-46	28.3	7.9	0-44	28.3	6.1	17-46
Picture Description	3.8	2.4	0-11	3.9	2.3	0-11	3.8	2.4	0-8
Prepositions	6.4	1.6	1-8	6.3	1.5	1-8	6.4	1.7	2-8
Rhymes	2.6	2.6	0-8	2.5	2.5	0-8	2.9	2.7	0-8
Counting	15.5	5.0	2-23	15.7	4.7	7-16	15.1	5.5	2-23
Problem Solving	18.7	5.4	5-25	18.8	5.4	5-25	18.5	5.6	5-25
Puzzle Vocabulary	17.4	5.4	0-23	17.4	5.4	0-23	17.4	5.5	3-23
Home Concepts 1	22.7	6.4	3-37	22.9	5.0	11-33	22.4	8.1	3-37
Home Concepts 2	1.9	1.1	0-4	1.9	1.1	0-4	1.8	1.1	0-3
Family Concepts	3.4	1.4	0-6	3.5	1.5	0-6	3.2	1.4	0-6
Color Concepts	38.9	19.2	7-63	39.1	19.1	7-63	38.6	19.6	9-63

Table 4b. Pretest Data on Original Population (by Subgroups)

Subgroups N		E1 18	C1 9	E2 19	C2 12	E3 18	C3 11	E4 16	C4 16
Age (Months)	Mean	49.2	49.1	49.3	49.3	49.5	47.5	48.7	48.4
	S.D.	2.2	2.1	2.3	2.3	1.8	1.0	3.1	4.0
Mental Age-Binet	Mean	49.2	50.2	47.4	50.0	47.4	49.2	47.6	48.5
	S.D.	6.5	2.9	5.5	10.5	5.3	6.4	8.7	8.1
Peabody	Mean	46.8	50.8	37.9	45.2	43.6	43.8	42.3	40.4
	S.D.	12.6	6.2	7.8	15.3	11.7	11.1	10.5	10.1
Goodenough	Mean	51.3	51.3	42.6	49.4	49.8	41.7	54.0	52.1
	S.D.	11.6	11.7	7.0	9.5	10.3	7.3	15.1	9.4
Expressive Vocabulary	Mean	27.0	28.4	23.6	24.3	26.1	25.3	24.0	24.1
	S.D.	7.1	4.6	4.8	4.4	3.2	4.8	5.4	5.2
Auditory Discrimination	Mean	30.6	33.0	28.1	28.1	28.5	28.5	28.8	28.8
	S.D.	4.8	4.5	4.9	4.9	4.1	4.1	4.2	4.2
Echoic Responding	Mean	11.4	14.9	12.9	12.1	14.3	11.1	12.6	14.9
	S.D.	3.5	2.4	2.8	4.8	2.8	3.3	3.0	3.3
Visual Discrimination	Mean	30.0	33.6	28.3	28.7	28.5	25.4	27.7	26.1
	S.D.	1.6	7.7	3.3	3.4	5.2	3.7	13.8	6.1
Picture Description	Mean	3.9	4.9	3.2	4.1	4.7	2.2	3.5	4.3
	S.D.	2.5	2.3	2.3	2.4	2.8	2.6	1.4	1.9
Prepositions	Mean	6.4	7.1	6.4	7.0	6.9	6.0	5.4	6.1
	S.D.	1.4	1.5	1.5	1.7	1.0	1.3	2.0	1.8

[a] Sites 1E and 1C had only Caucasian children; all other sites had Black children.

Table 4b (Continued)

Subgroups N		E1 18	C1 9	E2 19	C2 12	E3 18	C3 11	E4 16	C4 16
Prepositions	Mean	6.4	7.1	6.4	7.0	6.9	6.0	5.4	6.1
	S.D.	1.4	1.5	1.5	1.7	1.0	1.3	2.0	1.8
Rhymes	Mean	2.7	3.0	1.7	3.8	3.4	1.5	2.1	3.1
	S.D.	2.3	2.8	1.8	2.7	3.0	1.9	2.7	3.1
Counting	Mean	16.2	16.2	15.7	15.2	15.3	16.4	13.9	13.6
	S.D.	4.1	5.8	3.9	4.4	4.5	5.5	5.3	6.1
Problem Solving	Mean	20.7	19.8	18.7	16.9	18.3	20.0	17.1	16.9
	S.D.	4.1	4.0	5.7	6.1	5.4	4.9	6.4	5.7
Puzzle Vocabulary	Mean	20.7	27.2	19.0	17.8	17.9	17.6	12.0	15.3
	S.D.	3.1	3.2	2.1	4.9	5.8	6.0	4.4	6.3
Home Concepts 1	Mean	23.4	26.8	20.7	21.4	24.4	20.9	22.6	20.9
	S.D.	4.6	4.3	6.3	8.9	5.8	7.9	3.8	8.1
Home Concepts 2	Mean	2.4	1.9	1.5	1.3	2.5	2.0	1.3	2.1
	S.D.	0.8	1.1	1.1	0.9	0.9	1.3	1.2	1.1
Family Concepts	Mean	3.1	2.8	3.0	3.0	5.1	3.7	2.9	3.3
	S.D.	1.5	1.0	0.6	1.5	1.1	1.1	1.4	1.6
Color Concepts	Mean	47.7	50.1	40.1	33.3	42.7	41.5	26.1	33.5
	S.D.	14.2	15.7	16.5	16.4	20.6	15.9	18.7	23.3
Socioeconomic Status	Mean	7.9	6.9	9.8	9.8	11.3	10.7	11.2	10.8
	S.D.	0.9	0.8	1.3	1.6	0.8	0.9	1.2	1.1

[a] Sites 1E and 1C had only Caucasian children; all other sites had Black children.

Table 5

Means and Standard Deviations for all Tests Given at End of First Year (First Wave).

Subgroups N		E1 9	C1 7	E2 13	C2 7	E3 11	C3 6	E4 11	C4 9
Age (Months)	Mean	57.4	56.9	57.6	55.6	57.5	55.5	56.3	58.1
	S.D.	2.2	2.2	2.2	5.8	2.0	1.0	3.4	3.4
Mental Age-Peabody	Mean	67.4	71.6	49.5	56.4	57.5	46.5	48.7	57.5
	S.D.	6.4	12.4	10.8	21.0	8.0	12.5	8.2	10.1
Goodenough	Mean	58.3	61.7	61.0	55.3	60.3	61.0	54.4	72.4
	S.D.	11.3	11.2	6.9	6.0	8.9	12.6	7.6	13.4
Expressive Vocabulary	Mean	33.1	34.1	30.1	29.9	28.6	26.2	30.0	29.5
(40)[a]	S.D.	3.7	1.8	6.2	4.6	10.1	4.9	4.3	3.8
Auditory Discrimination	Mean	34.8	33.1	27.1	32.7	29.9	27.5	28.2	28.5
(38)	S.D.	2.5	4.0	4.0	4.4	3.7	5.4	5.1	4.8
Echoic Responding	Mean	15.4	16.4	16.3	14.7	17.1	14.4	16.8	15.6
(20)	S.D.	3.3	2.3	2.2	4.5	2.0	1.8	2.0	2.5
Picture Description	Mean	23.1	22.3	26.2	24.0	25.4	25.3	22.0	23.1
(30)	S.D.	4.8	3.0	3.4	1.6	2.8	4.1	10.1	5.6
Prepositions	Mean	7.1	7.3	7.5	6.4	7.6	7.2	5.8	5.3
(8)	S.D.	1.5	1.1	0.9	1.5	0.8	0.8	2.0	1.4
Nursery Rhymes	Mean	9.4	8.0	7.7	6.3	8.7	6.0	9.4	7.8
(11)	S.D.	3.3	3.4	2.7	1.8	2.5	1.9	1.7	2.9
Rhyming Words	Mean	8.6	7.1	8.7	6.3	7.9	2.2	6.8	5.6
(10)	S.D.	1.6	2.3	1.1	1.8	1.7	1.3	3.1	1.3

[a] Maximum Score

Table 5 (Continued)

Subgroups N		E1 9	C1 7	E2 13	C2 7	E3 11	C3 6	E4 11	C4 9
Count to 5	Mean	2.9	2.9	3.0	3.0	3.0	2.5	2.7	3.0
(3)	S.D.	0.3	0.4	0.0	0.0	0.0	0.8	0.9	0.0
Count Pictured Items	Mean	13.7	13.0	14.5	13.1	12.5	12.2	13.1	13.8
(15)	S.D.	1.9	3.7	0.8	3.2	2.8	3.7	2.0	1.9
Count Blocks	Mean	4.1	4.1	4.2	4.6	3.5	3.7	3.6	3.6
(5)	S.D.	1.4	1.5	0.8	0.8	1.1	1.5	1.2	1.1
Identify Number	Mean	9.1	9.0	8.8	9.3	7.5	7.2	7.5	8.1
(10)	S.D.	1.4	1.8	1.2	0.8	1.6	2.7	1.9	1.6
Identify Numeral	Mean	4.1	2.0	3.1	3.1	3.5	1.7	3.3	2.9
(5)	S.D.	1.5	2.2	2.0	2.3	1.4	2.6	1.8	2.0
Associate Number with Numeral	Mean	8.8	5.0	6.8	7.7	7.5	5.5	6.9	5.2
(10)	S.D.	2.1	1.3	2.8	2.0	2.3	3.9	2.3	2.9
Associate Numeral with Number	Mean	8.2	4.3	7.3	7.7	6.4	4.3	6.1	4.4
(10)	S.D.	2.3	2.8	3.0	2.9	3.0	3.9	3.3	2.2
Total Number Concepts	Mean	50.9	40.0	47.8	48.6	43.9	34.0	43.3	41.0
(58)	S.D.	5.5	8.2	8.5	9.7	9.8	13.6	9.3	8.4
Negation 1	Mean	5.9	5.9	6.0	5.0	5.9	5.2	6.0	5.7
(6)	S.D.	0.3	0.4	0.0	2.4	0.3	1.3	0.0	0.5

Table 5 (Continued)

Subgroups N		E1 9	C1 7	E2 13	C2 7	E3 11	C3 6	E4 11	C4 9
Negation 2	Mean	9.4	7.6	8.2	5.0	8.0	3.7	8.7	6.2
(10)	S.D.	0.7	1.5	2.1	3.0	2.0	2.9	0.4	2.9
Same-Not	Mean	9.9	10.0	10.0	9.9	10.0	10.0	9.9	10.0
(10)	S.D.	0.3	0.0	0.0	0.4	0.0	0.0	0.4	0.0
Disjunction	Mean	6.0	5.6	5.8	4.3	5.7	5.2	5.4	5.2
(6)	S.D.	0.0	0.5	0.5	2.2	0.5	1.0	1.1	1.4
Categories	Mean	8.6	7.9	8.0	7.6	7.8	6.3	7.3	7.1
(10)	S.D.	1.1	1.2	1.6	1.6	1.3	2.0	1.7	1.7
Bead-Shape and Color	Mean	5.6	7.3	5.8	5.6	6.3	5.0	4.8	4.9
(8)	S.D.	1.7	0.8	1.7	1.3	1.3	2.8	2.3	2.4
Total Problem Solving	Mean	45.3	43.3	43.6	36.4	43.7	35.3	36.7	39.1
(50)	S.D.	2.3	2.5	3.4	8.2	2.3	6.5	12.4	7.3
Home Concepts	Mean	20.9	19.0	19.1	16.0	18.5	11.7	17.6	16.9
(30)	S.D.	4.6	2.1	2.7	4.2	5.8	5.2	4.5	3.4
Birth	Mean	7.0	4.7	6.8	5.3	7.6	5.2	5.8	4.3
(10)	S.D.	2.3	0.5	2.1	1.0	1.6	1.2	1.9	1.5
Relations	Mean	5.6	4.9	4.8	4.3	5.9	3.5	4.4	4.2
(6)	S.D.	0.7	1.3	1.5	1.3	0.3	0.8	1.3	1.2

Table 5 (Continued)

Subgroups N		E1 9	C1 7	E2 13	C2 7	E3 11	C3 6	E4 11	C4 9
Label Animals	Mean	6.6	6.6	5.6	5.6	6.2	4.7	5.7	5.8
(7)	S.D.	0.5	0.5	0.5	1.0	0.9	1.4	0.6	0.7
Label Homes	Mean	4.3	4.6	4.0	3.3	4.6	2.5	4.3	3.9
(6)	S.D.	0.7	0.5	0.9	1.1	1.2	1.5	1.0	1.4
Animal-Home Association	Mean	6.7	5.7	5.4	3.6	5.8	2.2	5.6	4.2
(7)	S.D.	0.7	1.3	1.1	1.4	1.6	1.9	2.2	1.5
Total Family Concepts	Mean	30.1	26.1	26.5	22.6	30.2	18.0	25.3	22.8
(36)	S.D.	2.8	2.9	2.7	4.5	3.5	3.8	5.1	3.2
Color-Label	Mean	16.0	14.9	14.2	13.7	17.3	13.8	14.3	14.4
(18)	S.D.	2.6	3.2	5.9	4.9	2.1	4.6	5.5	5.0
Match	Mean	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
(9)	S.D.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Identify Objects by Color	Mean	17.2	17.3	16.8	16.0	17.5	15.4	16.1	16.1
(18)	S.D.	1.1	1.1	2.5	3.6	1.8	5.3	7.3	2.5
Identify Forms by Color	Mean	17.3	16.1	15.7	16.9	17.3	13.0	15.8	16.1
(18)	S.D.	1.0	2.3	3.8	1.9	1.8	4.3	3.3	2.8

Table 6a. Pretest, Posttest, and Adjusted Means for Pre-Post Measures at End of First Year (First Wave)

		Girls	Boys	Black	Caucasian	Experimental	Control
	N	34	33	51	16	39	28
Peabody Picture Vocabulary Test							
Pretest	Mean	42.0	45.9	41.2	51.3	42.7	45.5
	S.D.	13.3	11.5	12.1	10.0	12.4	12.7
Posttest	Mean	51.7	61.6	52.0	69.3	54.5	59.5
	S.D.	13.8	13.2	9.4	12.8	11.2	17.2
Adjusted	Mean	53.2	60.1	53.6	64.3	55.4	58.2
	S.E.	2.0	2.0	1.6	3.0	1.9	2.3
Goodenough Draw-a-Man Test							
Pretest	Mean	51.1	46.9	47.5	54.2	49.5	48.3
	S.D.	13.0	10.3	11.6	12.0	12.7	10.8
Posttest	Mean	60.0	57.4	58.5	59.8	59.0	58.3
	S.D.	10.1	11.1	10.6	11.0	8.8	12.8
Adjusted	Mean	59.5	57.9	58.4	58.9	58.9	58.5
	S.E.	2.5	2.6	2.1	3.8	2.3	2.8
Children's Auditory Discrimination Inventory							
Pretest	Mean	29.3	29.6	28.4	32.3	29.2	29.8
	S.D.	5.0	5.1	4.9	4.4	5.4	4.5
Posttest	Mean	29.1	30.4	28.1	34.1	29.1	30.5
	S.D.	5.3	4.5	4.5	3.2	4.8	5.1
Adjusted	Mean	29.1	30.3	28.6	32.8	29.3	30.3
	S.E.	0.9	0.9	0.7	1.3	0.9	1.0
Echoic Responding Inventory for Children							
Pretest	Mean	13.6	12.7	13.3	12.6	13.4	12.9
	S.D.	3.5	3.5	3.8	2.6	3.2	4.0
Posttest	Mean	15.3	15.7	15.3	15.9	15.9	14.8
	S.D.	2.6	2.8	2.7	2.9	2.4	3.0
Adjusted	Mean	15.1	15.9	15.2	16.0	15.9	14.9
	S.E.	0.6	0.6	0.5	0.9	0.6	0.6

Table 6a (Continued)

		Girls	Boys	Black	Caucasian	Experimental	Control
	N	34	33	51	16	39	28
				Expressive Vocabulary Inventory			
Pretest	Mean	25.6	24.8	24.2	28.0	24.9	25.6
	S.D.	4.4	5.8	4.8	5.4	5.1	5.2
Posttest	Mean	29.1	30.4	28.5	33.6	29.6	30.0
	S.D.	4.1	4.0	3.9	3.0	3.5	4.6
Adjusted	Mean	29.0	30.5	28.7	38.1	29.7	29.9
	S.E.	1.1	1.1	0.9	1.6	1.0	1.2
				Problem Solving			
Pretest	Mean	19.1	19.0	18.0	22.1	19.2	18.9
	S.D.	6.2	5.0	5.9	3.4	5.7	5.5
Posttest	Mean	41.4	41.6	40.5	44.4	43.6	38.6
	S.D.	7.0	5.5	6.9	2.5	4.8	7.0
Adjusted	Mean	41.3	41.7	41.0	42.6	43.4	38.7
	S.E.	0.9	0.9	0.8	1.4	0.7	0.9
				Counting			
Pretest	Mean	16.1	15.2	15.1	17.2	16.5	14.5
	S.D.	4.4	5.9	5.3	4.9	4.4	6.1
Posttest	Mean	28.6	28.1	27.9	29.3	28.6	27.9
	S.D.	3.9	5.6	4.5	5.7	3.9	5.9
Adjusted	Mean	28.4	28.3	28.2	28.7	28.3	28.4
	S.E.	0.7	0.8	0.6	1.1	0.7	0.8
				Color			
Pretest	Mean	43.7	36.9	37.6	48.4	42.1	38.0
	S.D.	20.8	18.5	20.4	16.3	19.9	19.9
Posttest	Mean	58.6	54.3	55.9	57.9	58.4	53.9
	S.D.	8.0	13.0	12.3	5.3	7.5	14.2
Adjusted	Mean	57.7	55.2	56.6	55.6	57.9	54.6
	S.E.	1.6	1.6	1.4	2.4	1.5	1.8

Table 6a (Continued)

		Girls	Boys	Black	Caucasian	Experimental	Control
	N	34	33	51	16	39	28
				Rhymes			
Pretest	Mean	3.3	2.7	2.9	3.1	2.9	3.1
	S.D.	3.0	2.5	2.8	2.8	2.8	2.9
Posttest	Mean	7.8	6.9	6.9	8.8	8.6	5.6
	S.D.	3.6	3.5	3.6	3.3	2.7	3.9
Adjusted	Mean	7.7	7.1	6.9	8.8	8.7	5.6
	S.E.	0.6	0.6	0.5	0.8	0.5	0.6
				Prepositions			
Pretest	Mean	6.8	6.5	6.5	7.0	6.7	6.7
	S.D.	1.6	1.6	1.7	1.5	1.5	1.7
Posttest	Mean	7.1	6.7	6.8	7.2	6.5	7.2
	S.D.	1.2	1.4	1.5	1.3	1.2	1.4
Adjusted	Mean	7.0	6.8	6.8	7.0	7.2	6.5
	S.E.	0.2	0.2	0.2	0.3	0.2	0.2
				Family Concepts			
Pretest	Mean	5.9	4.9	5.6	5.3	5.8	5.0
	S.D.	2.1	1.8	2.1	1.6	1.9	2.1
Posttest	Mean	8.8	8.8	9.7	8.5	9.5	7.9
	S.D.	2.1	1.9	2.1	1.4	1.6	2.1
Adjusted	Mean	8.6	9.0	8.5	9.8	9.4	8.0
	S.E.	0.3	0.3	0.3	0.5	0.3	0.3
				Home Concepts			
Pretest	Mean	23.1	22.8	22.1	24.9	22.9	23.0
	S.D.	6.9	7.2	5.9	9.4	5.6	8.6
Posttest	Mean	18.2	18.1	17.5	20.1	19.5	16.3
	S.D.	7.0	4.4	4.6	1.1	4.2	4.4
Adjusted	Mean	18.2	18.1	17.6	19.8	19.5	16.3
	S.E.	0.8	0.8	0.6	1.1	0.7	0.8

Table 6b

Pretest, Posttest, and Adjusted Means for Pre-Post Measures at End of First Year (by Subgroups).

		Black		Caucasian	
		Experimental	Control	Experimental	Control
	N	30	21	9	7
Peabody Picture Vocabulary Test					
Pretest	Mean	40.2	42.6	51.1	51.4
	S.D.	11.4	13.4	12.7	5.9
Posttest	Mean	50.6	54.2	67.4	71.6
	S.D.	10.0	16.3	6.4	12.4
Adjusted	Mean	51.3	53.2	67.5	71.6
	S.E.	2.2	2.7	2.9	3.4
Goodenough Draw-a-Man Test					
Pretest	Mean	47.8	46.9	52.7	55.3
	S.D.	12.3	10.7	12.8	11.6
Posttest	Mean	59.2	57.5	58.3	61.7
	S.D.	8.1	13.6	11.3	11.2
Adjusted	Mean	59.1	57.6	57.9	62.3
	S.E.	2.9	3.6	3.5	3.9
Children's Auditory Discrimination Inventory					
Pretest	Mean	28.3	28.7	32.3	32.3
	S.D.	5.5	4.1	4.2	4.9
Posttest	Mean	27.4	29.2	34.8	33.1
	S.D.	4.3	4.9	2.3	4.0
Adjusted	Mean	27.5	29.1	34.8	33.2
	S.E.	1.0	1.3	0.9	1.0
Echoic Responding Inventory for Children					
Pretest	Mean	13.6	12.7	12.4	12.9
	S.D.	3.1	4.6	3.2	2.0
Posttest	Mean	16.1	14.1	15.4	16.4
	S.D.	2.1	3.1	3.3	2.3
Adjusted	Mean	15.9	14.3	15.6	16.3
	S.E.	0.7	0.8	0.8	0.9

Table 6b (Continued)

		Black		Caucasian	
		Experimental	Control	Experimental	Control
	N	30	21	9	7
		Expressive Vocabulary Inventory			
Pretest	Mean	23.9	24.8	28.2	27.7
	S.D.	4.5	5.4	6.2	4.5
Posttest	Mean	28.5	28.5	33.1	34.1
	S.D.	3.3	4.5	3.7	1.8
Adjusted	Mean	28.6	28.4	33.0	34.3
	S.E.	1.3	1.6	0.8	0.9
		Problem Solving			
Pretest	Mean	18.0	18.0	23.0	20.9
	S.D.	6.0	5.8	1.6	4.7
Posttest	Mean	43.0	36.6	45.3	43.3
	S.D.	5.2	7.3	2.3	2.5
Adjusted	Mean	43.0	36.6	45.4	43.2
	S.E.	0.9	1.1	0.8	0.9
		Counting			
Pretest	Mean	15.7	14.2	19.1	14.7
	S.D.	4.4	6.4	3.3	5.8
Posttest	Mean	28.3	27.5	29.8	28.7
	S.D.	3.7	5.6	4.4	7.4
Adjusted	Mean	28.1	27.7	28.2	30.8
	S.E.	0.8	0.9	1.7	1.9
		Color			
Pretest	Mean	39.9	34.1	49.3	47.1
	S.D.	20.4	20.5	17.2	16.4
Posttest	Mean	58.4	52.3	58.4	57.3
	S.D.	8.1		5.0	6.0
Adjusted	Mean	57.7	53.3	58.3	57.5
	S.E.	1.9	2.4	1.6	1.8

Table 6b (Continued)

		Black		Caucasian	
		Experimental	Control	Experimental	Control
	N	30	21	9	7
		Rhymes			
Pretest	Mean	2.9	2.8	2.7	3.6
	S.D.	2.8	2.8	2.7	3.0
Posttest	Mean	8.4	4.8	9.4	8.0
	S.D.	2.5	3.9	3.3	3.4
Adjusted	Mean	8.4	4.8	9.6	7.8
	S.E.	0.5	0.7	1.1	1.3
		Prepositions			
Pretest	Mean	6.6	6.5	7.0	7.0
	S.D.	1.6	1.8	1.3	1.7
Posttest	Mean	7.2	6.2	7.1	7.3
	S.D.	1.1	1.4	1.5	1.1
Adjusted	Mean	7.2	6.2	7.1	7.3
	S.E.	0.2	0.2	0.3	0.4
		Family Concepts			
Pretest	Mean	5.8	5.2	5.8	4.6
	S.D.	1.9	2.1	1.3	1.7
Posttest	Mean	9.4	7.2	9.9	9.4
	S.D.	1.8	1.9	1.2	1.7
Adjusted	Mean	9.3	7.3	9.6	9.8
	S.E.	0.3	0.4	0.4	0.5
		Home Concepts			
Pretest	Mean	22.6	21.5	24.0	26.1
	S.D.	5.9	9.4	5.0	4.6
Posttest	Mean	19.1	15.1	20.9	19.0
	S.D.	4.0	4.5	4.6	2.1
Adjusted	Mean	19.1	15.1	21.2	18.6
	S.E.	0.8	0.9	1.2	1.3

Table 7 presents the analyses of covariance on the major variables based on the data in Tables 6a and 6b. The only measure which shows a significant main effect for sex is the PPVT, and this is contrary to the expected direction; that is, boys obtained higher scores than girls on this measure of verbal facility. Three of the 12 measures, CADI, EVI, and Family Concepts, showed significant effects due to ethnicity; the data indicate that Caucasian children obtained the higher scores. Finally, there were treatment effects on five of the seven criterion referenced tests, with the Black experimental groups being reliably superior to the controls. These findings might be interpreted as indicating that the Black children need this type of intervention, whereas the Caucasian children learned almost as much whether or not they received the special program. In counting and color recognition the Black control children seemed to be receiving adequate instruction in the regular day care program.

The pretest score of the First Wave children at the beginning of the second year for the major groups are given in Table 8a, and in Table 8b for the subgroups at the individual sites. Comparisons of the scores between the experimental and control groups for the 57 children who took both pre- and posttests are reported in Table 9. The levels of significance of the differences are also presented in this table. The experimental children obtained significantly higher scores on all but five of the 19 subtests; for two of the five the p-value was .12 and .07, indicating some tendency to approach significance. In general the skills showing no differences were those like letter and number recognition, which were being taught in the regular program.

Although the First Wave children received no further intervention after the kindergarten year, they were again tested at the end of first grade. In addition to the children who had been in the Centers, a new group of control children were randomly selected from the regular population in any class in which there were any children who had participated in the experiment. The posttest scores for the experimental and the two control groups are presented, with the Analyses of Variance, for the individual tests, in Table 10. Although there were no significant differences among the three groups on the Metropolitan Achievement Test, the scores all fell well above the mid-point of the test. Only one subtest of the four UCLA language tests showed a significant advantage for the children who had been in the Children's Centers, although there was no difference between the experimental and control groups.

Table 7

Analyses of Covariance on Major Variables
(Pretest as Covariate)

Source	df	M.S.	Error	F	M.S.	Error	F
			Peabody			Goodenough	
Sex	1,64	778.7	136.1	5.72*	38.6	212.2	0.18
Ethnicity	1,64	1214.5	130.2	9.33**	3.4	215.4	0.02
Treatment (All)	1,64	127.3	146.2	0.87	2.4	212.8	0.01
Treatment (Black)	1,48	44.5	147.3	0.30	28.6	255.2	0.11
Treatment (Caucasian)	1,13	67.8	79.3	0.85	76.1	111.1	0.69
			CADI			ERIC	
Sex	1,64	21.9	29.0	0.76	9.3	12.4	0.75
Ethnicity	1,64	190.7	26.2	7.27**	8.7	12.6	0.69
Treatment (All)	1,64	18.3	29.0	0.63	14.8	12.4	1.20
Treatment (Black)	1,48	30.6	32.2	0.95	35.4	14.2	2.49
Treatment (Caucasian)	1,13	10.3	7.5	1.37	2.1	6.5	0.33
			EVI			Problem Solving	
Sex	1,64	37.6	41.8	0.90	1.9	27.5	0.7
Ethnicity	1,64	216.3	39.6	5.47*	26.1	27.5	0.95
Treatment (All)	1,64	1.1	42.3	0.03	374.1	21.7	17.26**
Treatment (Black)	1,48	0.2	51.0	0.01	496.6	22.9	21.70**
Treatment (Caucasian)	1,13	5.2	5.9	1.13	17.9	6.0	2.98

Table 7 (Continued)

Analyses of Covariance on Major Variables
(Pretest as Covariate)

Source	df	M.S.	Error	F	M.S.	Error	F
			Counting			Color	
Sex	1,64	0.1	19.0	0.01	100.1	88.3	1.13
Ethnicity	1,64	2.9	19.2	0.15	14.0	90.9	0.15
Treatment (All)	1,64	0.0	19.0	0.00	180.6	87.0	2.08
Treatment (Black)	1,48	1.6	18.4	0.09	225.0	109.5	2.05
Treatment (Caucasian)	1,13	20.4	21.9	0.93	2.3	22.3	0.11
			Rhymes			Prepositions	
Sex	1,64	5.7	12.1	0.47	0.9	1.3	0.73
Ethnicity	1,64	39.1	11.6	3.38	0.6	1.3	0.43
Treatment (All)	1,64	158.4	9.7	16.28**	6.3	1.2	5.26*
Treatment (Black)	1,48	150.3	9.0	16.78**	10.7	1.2	8.62**
Treatment (Caucasian)	1,13	11.6	11.1	1.05	0.1	0.9	0.13
			Family Concepts			Home Concepts	
Sex	1,64	2.6	3.7	0.71	0.0	20.0	0.00
Ethnicity	1,64	20.3	3.4	6.04*	60.5	19.4	3.13
Treatment (All)	1,64	29.9	3.2	9.21**	171.7	17.4	9.89**
Treatment (Black)	1,48	46.6	3.1	15.18**	183.9	17.8	10.31**
Treatment (Caucasian)	1,13	0.1	1.5	0.09	25.7	12.3	2.09

$^{*}p < .05$; $^{**}p < .01$

Table 8a

Means and Standard Deviations for Tests Given at
Beginning of Second Year (First Wave).

			Total		Black		Caucasian	
	(Max. Score)		E	C	E	C	E	C
N			36	22	32	20	4	2
Identify Numerals	(15)	Mean	2.7	2.7	2.3	2.9	5.8	1.0
		S.D.	5.0	4.2	4.7	4.4	7.2	0.0
Associate Number with Objects	(5)	Mean	2.1	2.2	2.1	2.0	2.3	4.5
		S.D.	1.4	1.2	1.3	1.0	2.2	0.7
Associate Numeral with Objects	(10)	Mean	3.2	3.0	3.2	2.9	3.5	4.5
		S.D.	2.9	2.2	2.7	2.3	4.7	0.7
Associate Numerals with Number	(15)	Mean	5.3	4.1	5.0	4.1	7.5	4.5
		S.D.	4.0	3.8	3.7	3.8	5.8	4.9
Number Problems	(10)	Mean	1.6	1.7	1.3	1.6	3.8	3.5
		S.D.	1.6	1.9	1.3	1.5	2.5	4.9
Total Number Concepts	(55)	Mean	15.3	13.9	13.9	13.2	22.8	18.0
		S.D.	13.5	10.9	11.8	11.2	20.4	11.3
Meaningful Sequences	(5)	Mean	0.2	0.4	0.2	0.3	0.0	1.0
		S.D.	0.6	0.8	0.7	0.5	0.0	1.0
Reading Words	(10)	Mean	0.2	0.2	0.2	0.2	0.0	0.0
		S.D.	0.7	0.6	0.8	0.6	0.0	0.0
Selecting Words	(8)	Mean	4.1	3.8	4.3	3.7	2.8	4.5
		S.D.	2.0	1.9	1.9	2.0	2.8	0.7

Table 8a (Continued)

	(Max. Score)		Total E	Total C	Black E	Black C	Caucasian E	Caucasian C
N			36	22	32	20	4	2
Producing Letter Sounds	(6)	Mean	0.6	0.3	0.7	0.3	0.0	0.0
		S.D.	1.1	0.6	1.1	0.6	0.0	0.0
Total Reading Skills	(24)	Mean	4.9	4.2	5.2	4.2	2.8	4.5
		S.D.	2.7	2.3	2.6	2.4	2.8	0.7
Puzzle Vocabulary	(66)	Mean	58.3	57.0	58.1	57.2	60.3	56.0
		S.D.	5.2	5.7	5.4	5.8	2.9	7.1

Table 8b
Means and Standard Deviations for Tests Given at Beginning of Second Year (by Subgroups)

Subgroups	(Max. Score)		E2	C2	E3	C3	E4	C4
N			11	5	10	6	11	9
Identify Numerals	(15)	Mean	1.0	3.4	3.3	3.2	2.6	2.4
		S.D.	3.0	4.7	5.1	5.9	5.6	3.6
Associate Number with Objects	(5)	Mean	1.8	2.4	2.6	1.8	1.9	1.8
		S.D.	1.0	1.5	1.8	0.8	0.9	0.8
Associate Numeral with Objects	(10)	Mean	3.0	3.6	4.3	2.2	2.3	2.9
		S.D.	2.4	2.4	3.3	1.6	2.3	2.6
Associate Numerals with Number	(15)	Mean	4.4	3.2	5.9	3.8	4.8	4.8
		S.D.	3.7	2.9	4.8	4.4	2.9	4.2

Table 8b (Continued)

Subgroups N	(Max. Score)		E2 11	C2 5	E3 10	C3 6	E4 11	C4 9
Number Problems	(10)	Mean	0.6	1.2	1.3	1.7	1.9	1.7
		S.D.	0.7	1.3	1.2	2.2	1.5	1.1
Total Number Concepts	(55)	Mean	10.8	13.8	17.6	12.7	12.6	12.8
		S.D.	8.7	8.9	14.5	13.7	5.8	7.0
Meaningful Sequences	(5)	Mean	0.4	0.2	0.0	0.3	0.3	0.3
		S.D.	0.7	0.4	0.0	0.8	0.9	0.7
Reading Words	(10)	Mean	0.3	0.8	0.0	0.0	0.4	0.0
		S.D.	0.9	1.1	0.0	0.0	0.9	0.0
Selecting Words	(8)	Mean	4.2	4.2	4.5	3.8	4.1	3.3
		S.D.	2.0	1.1	1.8	2.6	2.0	2.1
Producing Letter Sounds	(6)	Mean	1.7	0.6	0.1	0.3	0.3	0.1
		S.D.	1.3	0.9	0.3	0.8	0.6	0.3
Total Reading Skills	(24)	Mean	6.2	5.6	4.6	4.2	4.6	3.4
		S.D.	2.6	1.9	2.0	3.1	3.0	2.0
Puzzle Vocabulary	(66)	Mean	58.9	58.8	59.5	56.2	56.1	55.8
		S.D.	4.2	5.2	2.4	5.3	7.7	5.8

Table 9

Comparison of Posttest Scores at End of Second Year for Total Experimental and Control Groups (First Wave)

Subtest	(Max. Score)		E (N=33)	C (N=24)	P Value[a]
Identify Numerals	(10)	Mean	7.8	6.5	.12
		S.D.	2.9	3.7	
Associate Number with Objects	(5)	Mean	4.2	3.4	.02
		S.D.	1.1	1.2	
Associate Numeral with Objects	(10)	Mean	7.8	6.4	.02
		S.D.	2.3	2.3	
Associate Numerals with Number	(15)	Mean	11.9	9.9	.07
		S.D.	3.1	4.9	
Number Problems	(12)	Mean	8.6	5.8	.00
		S.D.	2.7	3.4	
Add and Subtract	(10)	Mean	9.0	8.8	.70
		S.D.	1.8	1.9	
More/Less/Same	(6)	Mean	4.8	4.6	.61
		S.D.	1.1	1.2	
Total Number Concepts	(71)	Mean	57.2	48.2	.01
		S.D.	11.3	14.4	
Meaningful Sequences	(5)	Mean	3.4	2.1	.01
		S.D.	1.7	1.7	
Reading Words	(42)	Mean	28.2	17.3	.02
		S.D.	13.3	19.1	
Word Discrimination	(15)	Mean	8.9	6.8	.04
		S.D.	4.0	3.4	
Producing Letter Sounds	(12)	Mean	8.7	7.5	.24
		S.D.	3.4	4.0	
Total Reading	(69)	Mean	45.8	31.7	.01
		S.D.	16.2	22.9	
Matrix Terminology	(6)	Mean	3.2	1.2	.00
		S.D.	1.7	1.1	
Double Categorization	(27)	Mean	16.0	7.6	.00
		S.D.	6.6	4.7	

[a] Taken from BMDX70 T Program, UCLA Central Computing Network

Table 9 (Continued)

Subtest	(Max. Score)		E (N=33)	C (N=24)	P Value
Yes, No, Can't Tell	(6)	Mean	5.1	3.8	.00
		S.D.	1.0	1.2	
All, Some, None	(3)	Mean	2.5	1.8	.00
		S.D.	0.7	0.5	
Always, Sometimes, Never	(6)	Mean	4.7	3.6	.01
		S.D.	1.3	1.6	
Total Problem Solving	(48)	Mean	31.6	18.1	.00
		S.D.	9.3	6.2	

Table 10

Comparison of Posttest Scores at End of First Grade. (First Wave)

	(Max. Score)		E	C1	C2	Mean Square	Error	F.
N			29	20	20			
Metropolitan Word Meaning	(16)	Mean	8.3	9.0	8.9	6.86	3.29	0.48
		S.D.	2.5	2.4	3.0			
Metropolitan Listening	(16)	Mean	10.1	9.6	10.7	5.26	5.54	1.05
		S.D.	2.0	2.6	2.3			
Metropolitan Matching	(14)	Mean	10.0	10.6	10.9	5.61	4.17	0.74
		S.D.	2.7	2.3	1.9			
Metropolitan Alphabet	(16)	Mean	15.4	15.8	15.7	1.65	1.12	0.67
		S.D.	1.9	0.4	0.6			
Metropolitan Numbers	(26)	Mean	15.2	16.3	17.1	11.06	20.97	1.89
		S.D.	2.5	3.2	4.4			
Metropolitan Copying	(14)	Mean	6.4	6.8	6.2	6.20	1.81	0.29
		S.D.	2.4	2.6	2.4			
Metropolitan Total	(102)	Mean	65.0	68.1	69.2	79.39	115.91	1.46
		S.D.	7.9	7.7	11.2			
Picture Reading A		Mean	4.1	4.2	4.5	2.00	0.97	0.43
		S.D.	1.5	1.0	1.7			
Picture Reading B		Mean	6.5	6.0	4.9	3.22	15.29	4.74*
		S.D.	2.3	1.1	1.6			

*$p < .05$

Table 10 (Continued)

	(Max. Score)		E	C1	C2	Mean Square	Error	F.
N			29	20	20			
Picture Description	(31)	Mean	22.9	23.5	21.7	19.53	17.80	0.91
		S.D.	3.7	4.6	5.2			
Total Picture Reading		Mean	33.4	33.7	31.0	30.22	46.19	1.52
		S.D.	5.1	4.6	6.7			
Parallel Production	(149)	Mean	127.2	128.8	124.2	99.34	110.00	1.11
		S.D.	11.4	6.2	10.8			

The data for the pretests on the beginning Second Wave, in Tables 11a and 11b, may be compared to the scores obtained by the First Wave children reported in Table 4a and 4b. Although no test of the differences between the two Waves was carried out before the final evaluation, inspection of the two sets of tables would indicate that the Second Wave children generally demonstrated an inferior level of performance. This may have been due to the fact that the pretesting program in the second year got under way sooner, and thus the children had had less exposure to the regular academic program in the day care centers. Comparison of the scores of the experimental and control groups of the Second Wave reveals that again the random assignment to treatment resulted in a slight bias in favor of the control group. Also the Caucasian children tended to have higher pretest scores.

The posttest means on the various subtests given at the end of the first year to the Second Wave experimental and control groups, as well as the level of significance of the difference for each subtest are presented in Table 12. There were some variations among the subtests in various categories, in seven of the nine major skill areas the experimental groups were superior to the controls. There were no differences in color or problem-solving, where all the children approached the maximum scores.

Table 13 presents in very compact form all the data for the second year of the Second Wave. It is interesting to note that on many of the math subtests, as well as in the total math score, the controls do significantly better than the experimental groups, attesting to the effectiveness of the drill sessions which were provided for the children in the control sites.

In all other areas, the differences favored the experimental groups. For example, on the test of prereading skills the experimental group on the whole was superior to the control. However, of the 39 comparison, 24 showed no differences, 9 favored the experimental and 6 the control groups. Table 14 displays the comparison of the scores on the final testing for the First and Second Wave children. In all groups, there was a significant pre-post gain in I.Q. as measured by the PPVT. For the First Wave, t-test values were 6.50 and 3.16 for the experimental and control groups, respectively. While both values are significant at the .01 level, the experimental group made even greater gains. The same was true for the Second Wave children. The t-test for the pre-post differences on the PPVT was 7.86 for the experimental group and 4.37 for the control. The greatest gain (15.6 points) was made by the experimental children in the Second Wave.

Table 11a. Means and Standard Deviations for Tests Given at Beginning of First Year (Second Wave)

			Total		Black		Caucasian	
			E	C	E	C	E	C
Variables	(Max. Score)	N	58	54	44	37	14	17
Age (Months)		Mean	49.4	49.5	49.3	49.7	49.9	49.1
		S.D.	3.3	2.3	1.9	2.4	5.9	2.1
Mental Age-Peabody		Mean	40.0	43.4	37.5	39.6	47.9	51.6
		S.D.	9.1	11.0	7.5	8.6	9.4	11.5
Goodenough		Mean	49.2	48.3	49.0	47.5	50.1	50.1
		S.D.	10.7	8.1	8.2	7.8	12.5	8.7
Expressive Vocabulary	(40)	Mean	21.1	21.5	20.6	20.1	22.7	24.5
		S.D.	5.8	5.3	6.0	5.2	4.9	4.3
Auditory Discrimination	(38)	Mean	26.2	28.1	26.9	28.4	23.9	27.6
		S.D.	4.3	5.0	4.2	5.1	3.9	4.8
Echoic Responding	(20)	Mean	10.4	10.7	9.9	9.7	11.9	12.8
		S.D.	4.5	4.2	4.4	4.2	4.6	3.4
Picture Reading		Mean	6.4	6.5	6.3	5.7	6.6	8.2
		S.D.	4.1	4.2	3.9	4.1	4.7	4.0
Picture Description	(30)	Mean	14.5	15.0	13.2	12.5	18.6	20.5
		S.D.	5.6	6.3	5.2	5.6	4.8	3.7

Table 11a. (Continued)

			Total		Black		Caucasian	
			E	C	E	C	E	C
Variables	(Max. Score)	N	58	54	44	37	14	17
Prepositions	(8)	Mean	5.7	6.1	5.6	5.8	5.8	6.9
		S.D.	1.9	1.6	1.9	1.5	1.8	1.6
Rhymes	(11)	Mean	3.3	3.9	2.4	3.7	6.4	4.1
		S.D.	3.4	2.9	2.6	2.8	3.9	3.3
Counting	(33)	Mean	18.6	19.4	16.7	18.1	24.7	22.4
		S.D.	9.1	7.5	8.7	7.7	7.8	5.4
Problem Solving	(52)	Mean	26.9	32.0	24.7	28.9	33.7	38.8
		S.D.	11.1	9.5	10.4	8.7	10.8	7.7
Puzzles Vocabulary	(66)	Mean	45.4	45.3	44.2	43.4	49.1	49.6
		S.D.	6.3	7.4	6.0	6.8	5.9	7.1
Home Concepts	(24)	Mean	11.8	11.1	11.3	11.0	13.2	11.4
		S.D.	3.6	3.5	3.6	3.7	3.4	3.0
Color Concepts	(54)	Mean	39.0	41.7	36.8	39.3	45.9	46.9
		S.D.	14.2	12.2	14.7	13.4	10.4	7.0

Table 11b. Means and Standard Deviations for Tests Given at Beginning of First Year (by Subgroups)

Variables	(Max. Score)		E2	C2	E3	C3	E4	C4
		N	15	10	13	9	16	18
Age (Months)		Mean	49.3	50.3	49.4	49.6	49.1	49.4
		S.D.	1.6	1.6	1.9	2.5	2.1	2.7
Mental Age-Peabody		Mean	35.7	41.8	38.9	36.2	38.1	40.1
		S.D.	5.4	8.1	7.2	4.4	9.2	10.1
Goodenough		Mean	46.2	53.1	51.0	44.3	49.9	46.0
		S.D.	8.5	6.5	7.8	10.7	8.0	5.2
Expressive Vocabulary	(40)	Mean	17.3	23.9	25.3	19.0	19.9	18.6
		S.D.	4.1	4.4	5.9	4.8	5.4	4.9
Auditory Discrimination	(38)	Mean	25.1	31.8	27.7	26.4	27.9	27.4
		S.D.	4.4	4.9	3.2	6.0	4.4	4.0
Echoic Responding	(20)	Mean	6.2	13.6	12.6	7.9	11.3	8.5
		S.D.	2.9	1.8	4.2	4.3	3.2	3.8
Picture Reading		Mean	7.2	8.5	5.6	3.0	6.1	6.8
		S.D.	4.1	1.6	5.0	2.9	2.7	4.8
Picture Description	(30)	Mean	11.9	14.2	16.9	9.7	11.4	13.0
		S.D.	6.7	4.0	2.3	5.8	3.7	6.0

Table 11b. (Continued)

Variables	(Max. Scores)	N	E2 15	C2 10	E3 13	C3 9	E4 16	C4 18
Prepositions	(8)	Mean	4.3	6.4	6.7	5.3	6.0	5.7
		S.D.	1.7	1.3	1.2	1.1	1.9	1.8
Rhymes	(11)	Mean	1.4	5.6	4.0	1.4	1.9	3.8
		S.D.	1.8	2.5	3.4	1.8	1.9	2.5
Counting	(33)	Mean	12.8	20.3	17.9	17.7	19.4	17.0
		S.D.	7.0	6.3	9.3	8.0	8.7	8.4
Problem Solving	(52)	Mean	25.5	34.5	21.1	25.9	28.8	27.3
		S.D.	10.0	9.0	11.0	7.0	9.5	8.2
Puzzles Vocabulary	(66)	Mean	45.2	47.8	45.7	39.4	42.2	42.8
		S.D.	5.7	5.4	5.7	5.7	6.3	6.8
Home Concepts	(24)	Mean	9.5	9.8	12.1	11.1	12.4	11.6
		S.D.	4.1	1.2	1.8	5.0	3.7	3.9
Color Concepts	(54)	Mean	30.7	41.1	42.8	42.1	37.0	36.8
		S.D.	12.8	8.0	16.8	14.2	13.0	15.5

Table 12.Posttest Means and Standard Deviations for Tests Given at End of First Year (Second Wave)

Variables	(Max. Scores)	Experimental (N=50)		Control (N=41)		P-Value
		Mean	S.D.	Mean	S.D.	
Picture Reading						
Description	(30)	22.5	3.9	20.9	4.3	.09
Story A		4.7	2.0	3.2	2.3	.01
Story B		6.2	2.4	5.7	2.4	.27
Total		33.2	5.8	29.9	7.4	.03
Parallel Production	(70)	59.8	6.1	55.5	10.9	.02
Problem Solving						
Negation 1	(6)	5.2	1.7	5.4	1.6	.63
Negation 2	(10)	7.0	2.9	6.8	3.0	.70
Same-Not	(10)	9.4	1.0	9.3	0.9	.39
Disjunction	(6)	5.3	1.3	5.0	1.5	.31
Categories	(10)	8.2	1.5	8.0	1.7	.43
Total	(42)	35.1	5.8	34.2	5.9	.48
Sequencing						
Ordering A	(6)	4.8	1.2	4.1	1.4	.01
Ordering B	(16)	13.9	2.9	9.8	4.8	.01
Total	(22)	19.4	5.7	13.9	5.5	.01
Opposites	(12)	5.4	3.4	1.6	3.1	.01
Numbers						
Counting A	(3)	3.0	0.1	2.9	0.3	.23
Counting B	(10)	9.2	1.1	8.9	1.9	.26
Counting C	(5)	4.1	1.2	3.9	1.1	.47
Counting D	(10)	8.2	2.2	8.2	1.1	.99
Counting E	(4)	3.5	1.0	3.4	0.9	.66
Selecting A	(5)	4.4	1.1	4.0	1.2	.13
Selecting B	(10)	7.7	2.7	6.3	3.2	.03
Selecting C	(10)	7.8	2.5	6.4	2.5	.01
Selecting D	(10)	7.6	2.3	6.3	3.1	.02
Quantities	(6)	4.6	1.2	3.9	1.0	.01
Total	(73)	60.4	12.0	53.6	11.9	.01

Table 12. (Continued)

Variables	(Max. Scores)	Experimental (N=50) Mean	S.D.	Control (N=41) Mean	S.D.	P-Value
Families and Homes						
Birth	(10)	6.9	1.9	4.7	1.7	.01
Relations	(6)	5.2	1.0	4.1	1.5	.01
Label Animals	(7)	6.0	0.9	6.0	0.7	.78
Label Homes	(7)	4.0	1.4	2.9	1.5	.01
Animal Home Associations	(7)	5.4	1.7	4.6	1.7	.04
Total	(37)	27.6	4.4	22.3	5.3	.01
Home Concepts						
Pointing	(12)	10.3	1.4	9.3	1.8	.01
Labeling	(12)	7.6	1.8	5.9	1.8	.01
Total	(24)	17.9	2.8	15.2	3.3	.01
Color						
Label	(9)	8.5	0.9	8.3	1.5	.44
Select	(18)	17.4	1.8	17.0	1.6	.29
Total	(27)	25.8	3.0	25.4	2.9	.50

Table 13
ADJUSTED POSTTEST MEANS AND STANDARD ERRORS FOR EXPERIMENTAL (E) AND CONTROL (C) GROUPS
(Pretest and I.Q. as Covariates)

Variables		Anglo		Black		Total	
		E (N=10)	C (N=7)	E (N=27)	C (N=21)	E (N=37)	C (N=28)
Peabody Picture Vocabulary		94.0	102.0	81.7	82.2	85.0	87.1
1. Count for me (16)	Pre	10.5	10.7	12.9	14.3	12.3	13.4
	Mean	15.7	15.4	15.6	15.9	15.6	15.8
	S.E.	0.4	0.4	0.1	0.2	0.1	0.2
	F	0.33		1.48		0.58	
2. Identifying Numerals (10)	Pre	4.0	4.0	3.3	2.9	3.5	3.1
	Mean	9.9	8.8	8.1	8.6	8.6	8.6
	S.E.	0.4	0.4	0.6	0.6	0.4	0.5
	F	3.61		0.32		0.00	
3. Counting Objects (10)	Pre	8.0	7.1	7.4	4.9	7.6	5.5
	Mean	9.5	9.3	8.1	9.5	8.5	9.5
	S.E.	0.3	0.4	0.4	0.5	0.3	0.4
	F	0.20		4.25*		3.30	
4. Selecting Objects (10)	Pre	5.9	5.4	5.7	3.9	5.8	4.8
	Mean	9.4	9.1	7.3	9.0	7.9	9.1
	S.E.	0.3	0.4	0.5	0.6	0.3	0.4
	F	0.41		4.80*		5.93*	
5. Counting (10)	Pre	6.1	5.3	4.0	4.1	4.5	4.5
	Mean	8.7	9.0	7.2	8.4	7.5	8.6
	S.E.	0.4	0.4	0.4	0.5	0.3	0.4
	F	0.38		3.54		4.16*	
6. Selecting Numerals (10)	Pre	7.9	7.7	7.4	6.4	7.5	6.8
	Mean	9.7	9.4	9.1	9.9	9.3	9.8
	S.E.	0.4	0.4	0.2	0.2	0.2	0.2
	F	0.33		7.82**		4.26*	

*$p < .05$; **$p < .01$. (Number in parenthesis is maximum score.)

Table 13 (Continued)

ADJUSTED POSTTEST MEANS AND STANDARD ERRORS
FOR EXPERIMENTAL (E) AND CONTROL (C) GROUPS
(Pretest and I.Q. as Covariates)

		Anglo		Black		Total	
		E (N=10)	C (N=7)	E (N=27)	C (N=21)	E (N=37)	C (N=28)
7. Word Problems (12)	Pre	6.2	4.3	4.5	5.4	5.0	5.1
	Mean	9.1	9.3	7.1	9.1	7.6	9.1
	S.E.	0.5	0.6	0.6	0.6	0.4	0.5
	F	0.12		5.56*		5.33*	
8. Number Problems (12)	Pre	5.8	3.4	4.0	2.9	4.5	3.0
	Mean	9.5	8.7	7.9	6.2	8.3	6.9
	S.E.	1.1	1.4	0.8	0.9	0.6	0.7
	F	0.15		2.10		2.21	
9. More/Less/Same (12)	Pre	7.8	7.7	7.4	5.4	7.5	6.0
	Mean	10.6	9.9	8.7	9.4	9.3	9.5
	S.E.	0.4	0.5	0.6	0.7	0.4	0.5
	F	1.11		0.46		0.10	
10. Math Subtotal 1 (1-6) (66)	Pre	43.6	40.3	40.7	37.1	41.4	37.9
	Mean	62.7	60.9	55.2	61.8	57.0	61.6
	S.E.	1.0	1.1	1.4	1.6	1.2	1.3
	F	1.46		9.73**		6.80*	
11. Math Subtotal 2 (7-9) (36)	Pre	19.8	15.4	15.9	13.7	17.0	14.2
	Mean	29.4	27.8	22.2	25.5	24.0	26.2
	S.E.	1.7	2.1	1.4	1.6	1.1	1.3
	F	0.32		2.34		1.48	
12. Math Total (10-11) (102)	Mean	92.2	88.7	77.4	87.3	81.0	87.8
	S.E.	1.9	2.3	1.8	2.0	1.7	1.9
	F	1.38		5.05*		4.30*	
13. Social Studies[a] (17)	Mean	12.2	7.8	8.6	6.9	9.5	7.1
	S.E.	0.9	1.1	0.3	0.4	0.3	0.4
	F	9.77**		10.55**		18.67**	

*p<.05; **p<.01. [a] No pretest.

Table 13 (Continued)
ADJUSTED POSTTEST MEANS AND STANDARD ERRORS
FOR EXPERIMENTAL (E) AND CONTROL (C) GROUPS
(Pretest and I.Q. as Covariates)

		Anglo		Black		Total	
		E (N=10)	C (N=7)	E (N=27)	C (N=21)	E (N=37)	C (N=28)
14. Alphabet (20)	Pre	10.8	8.7	13.3	11.2	12.6	10.6
	Mean	18.7	13.9	18.1	18.0	18.1	17.1
	S.E.	1.5	1.8	0.7	0.8	0.7	0.8
		4.12*		0.00		0.96	
15. Letter Recognition (15)	Pre	3.0	3.6	4.1	2.9	3.8	3.0
	Mean	13.1	12.3	11.6	13.1	12.0	12.9
	S.E.	0.7	0.8	0.6	0.7	0.5	0.6
	F	0.51		2.47		1.15	
16. Word Pronunciation (26)	Pre	0.0	0.0	0.3	0.1	0.2	0.1
	Mean	6.5	4.4	2.1	0.4	3.4	1.3
	S.E.	2.7	3.2	0.5	0.6	0.8	0.9
	F	0.27		5.44*		3.18	
17. Word Discrimination (15)	Pre	5.1	5.0	4.5	5.1	4.7	5.1
	Mean	7.2	7.0	6.6	5.6	6.7	6.0
	S.E.	1.3	1.5	0.4	0.5	0.4	0.5
	F	0.01		2.11		0.95	
18. Reading Total (76)	Pre	20.4	18.6	22.2	20.3	21.8	19.8
	Mean	46.6	38.6	38.4	33.0	40.5	34.3
	S.E.	5.0	5.7	1.6	1.9	1.7	2.0
	F	1.09		4.91*		5.67*	
19. Sequencing (10)	Pre	2.2	2.2	1.9	2.0	2.0	2.0
	Mean	9.7	7.1	7.2	6.5	7.8	6.7
	S.E.	1.0	1.1	0.6	0.7	0.6	0.6
	F	2.94		0.59		1.82	

*p<.05; **p<.01.

Table 13 (Continued)
ADJUSTED POSTTEST MEANS AND STANDARD ERRORS FOR EXPERIMENTAL (E) AND CONTROL (C) GROUPS
(Pretest and I.Q. as Covariates)

			Anglo		Black		Total	
			E (N=10)	C (N=7)	E (N=27)	C (N=21)	E (N=37)	C (N=28)
20.	Logic 1 (6)	Pre	3.8	4.0	4.1	3.8	4.0	3.8
		Mean	5.6	4.0	5.0	4.4	5.1	4.3
		S.E.	0.2	0.2	0.2	0.2	0.1	0.2
		F	24.33**		4.36*		12.34**	
21.	Logic 2 (9)	Pre	4.9	5.9	5.6	5.1	5.4	5.3
		Mean	7.9	4.3	6.6	6.9	7.0	6.2
		S.E.	0.5	0.7	0.3	0.3	0.3	0.3
		F	17.25**		0.38		3.00	
22.	Logic - Total (15)	Pre	8.7	9.9	10.0	9.1	9.6	9.3
		Mean	13.5	8.3	11.6	11.3	12.1	10.6
		S.E.	0.4	0.5	0.4	0.5	0.9	1.0
		F						
23.	Matrix 1 (9)	Pre	4.4	3.0	3.0	3.4	3.4	3.3
		Mean	6.9	1.2	3.4	3.2	4.4	2.7
		S.E.	0.9	0.1	0.5	0.6	0.5	0.6
		F	15.49**		0.12		5.17*	
24.	Matrix 2 (6)	Pre	4.1	2.6	3.2	2.6	3.5	2.6
		Mean	5.9	2.6	4.5	3.8	4.9	3.6
		S.E.	0.3	0.4	0.4	0.4	0.3	0.4
		F	38.43**		1.51		7.37**	
25.	Matrix 3 (14)	Pre	4.8	6.3	3.8	6.2	4.1	6.2
		Mean	9.0	7.9	8.2	7.0	8.4	7.2
		S.E.	0.5	0.6	0.5	0.6	0.4	0.5
		F	1.49		2.11		3.42	

*p<.05; **p<.01.

Table 13 (Continued)
ADJUSTED POSTTEST MEANS AND STANDARD ERRORS
FOR EXPERIMENTAL (E) AND CONTROL (C) GROUPS
(Pretest and I.Q. as Covariates)

			Anglo		Black		Total	
			E (N=10)	C (N=7)	E (N=27)	C (N=21)	E (N=37)	C (N=28)
26.	Matrix - Total (29)	Pre	12.8	11.9	10.0	11.9	10.8	11.9
		Mean	23.0	11.3	18.9	14.4	20.0	13.7
		S.E.	1.0	1.2	1.2	1.4	1.0	1.1
		F	52.43**		5.96*		18.67**	
27.	V.D.I.^{a} (33)	Mean	28.7	27.7	27.1	27.0	27.5	27.2
		S.E.	1.3	1.5	0.8	0.9	0.7	0.8
		F	0.28		0.01		0.11	
28.	Categorization: 1) Analytical (17)	Pre	0.6	0.8	1.9	2.2	1.5	1.8
		Mean	4.5	1.6	3.9	3.7	4.0	3.2
		S.E.	1.1	1.4	0.8	1.0	0.6	0.8
		F	2.64		0.03		0.63	
29.	2) Relational (17)	Pre	1.8	0.5	1.4	1.5	1.5	1.2
		Mean	0.7	1.3	0.8	0.8	0.8	1.0
		S.E.	0.4	0.5	0.2	0.3	0.2	0.3
		F	0.82		0.01		0.25	
30.	3) Inferential (17)	Pre	0.9	0.2	1.4	1.7	1.3	1.2
		Mean	1.4	2.2	0.9	1.2	1.0	1.4
		S.E.	0.5	0.7	0.2	0.3	0.2	0.3
		F	0.61		0.89		1.40	
31.	Total (51)	Pre	3.2	1.5	4.6	5.3	4.3	4.2
		Mean	6.5	5.3	5.6	6.5	5.8	6.1
		S.E.	1.1	1.3	0.8	1.0	0.6	0.8
		F	0.44		0.53		0.10	
32.	Set Manipulation^a (19)	Mean	15.2	9.3	11.7	10.5	12.5	10.2
		S.E.	0.8	0.9	0.5	0.6	0.5	0.6
		F	24.49**		2.22		10.54**	

*$p < .05$; **$p < .01$. ^{a}No pretest.

Table 13 (Continued)
ADJUSTED POSTTEST MEANS AND STANDARD ERRORS
FOR EXPERIMENTAL (E) AND CONTROL (C) GROUPS
(Pretest and I.Q. as Covariates)

		Anglo		Black		Total	
		E (N=10)	C (N=7)	E (N=27)	C (N=21)	E (N=37)	C (N=28)
33. Sets & Sub-sets[a] (14)	Mean	9.1	7.8	7.4	7.5	7.8	7.5
	S.E.	0.8	0.9	0.5	0.6	0.4	0.5
	F	1.18		0.00		0.26	
34. Sets - Total[a] (33)	Mean	24.3	17.2	19.1	18.0	20.4	17.7
	S.E.	1.2	1.4	0.7	0.9	0.6	0.8
	F	15.03**		1.12		7.19**	
35. Picture Reading 1	Pre	1.6	3.0	2.5	2.4	2.3	2.5
	Mean	4.8	4.6	4.3	4.3	4.5	4.4
	S.E.	0.3	0.4	0.2	0.3	0.2	0.2
	F	0.12		0.00		0.06	
36. Picture Reading 2	Pre	4.3	5.6	4.0	3.4	4.1	4.0
	Mean	6.1	5.4	5.9	5.9	6.0	5.7
	S.E.	0.5	0.6	0.3	0.3	0.2	0.3
	F	0.73		0.01		0.34	
37. Picture Description	Pre	17.7	21.2	12.9	12.6	14.0	14.5
	Mean	23.8	21.8	20.1	21.9	21.0	21.9
	S.E.	1.0	1.3	0.9	1.1	0.7	0.9
	F	1.37		1.67		0.62	
38. Total Picture Reading[a]	Mean	34.5	32.6	30.3	32.1	31.3	32.2
	S.E.	1.2	1.5	0.9	1.2	0.7	1.0
	F	1.00		1.36		0.55	
39. Parallel Production	Pre	48.9	53.6	37.8	41.5	40.4	44.5
	Mean	117.1	121.2	117.1	123.3	117.0	123.0
	S.E.	5.3	6.4	2.3	2.9	2.2	2.6
	F	0.24		2.72		3.05	

*p < .05; **p < .01. [a] No pretest.

Table 14

MEANS AND STANDARD DEVIATIONS FOR TESTS GIVEN AT END OF STUDY

		First Wave/Second Grade			Second Wave/First Grade		
		Experimental (N=18)	Control (N=16)	New Control (N=34)	Experimental (N=29)	Control (N=21)	New Control (N=50)
Peabody IQ	Mean	92.8	95.4	91.2	99.3	94.4	95.2
	S.D.	8.6	9.9	9.8	11.0	8.6	14.6
Picture Reading	Mean	18.6	17.6	15.3	14.9	13.8	14.1
	S.D.	6.6	3.6	4.4	3.7	5.1	4.6
Parallel Sentences	Mean	124.1	134.8	129.5	128.9	126.4	122.4
	S.D.	3.0	6.2	7.5	8.6	14.3	20.1
Logic	Mean	10.2	10.4	9.7	9.6	9.0	8.5
	S.D.	2.1	1.7	1.9	2.1	2.4	2.0
Matrix	Mean	5.7	5.3	3.8	3.5	3.1	2.7
	S.D.	2.8	2.7	2.4	2.3	1.9	1.6
Sets	Mean	8.9	9.6	8.6	8.5	7.9	8.4
	S.D.	2.1	2.4	2.4	2.5	2.9	2.5

Because of limitations imposed by the testing policy adopted by the Los Angeles Schools, it was impossible to use the same reading test for the first grade children in the two Waves, or for the first and second grade children at the end of the last year of the study. As reported earlier, the first group of first-graders received the Metropolitan Achievement Test whereas the Second Wave children at the end of first grade were given the Cooperative Reading Tests. In addition a third test, the Stanford Achievement Test, was given to the second graders. The scores on the tests given to the experimental and the two control groups at the end of the study are presented on Table 15. Again, no significant differences on these measures among the three groups were obtained.

In conclusion, while the children showed important gains during the course of the study, and demonstrated their ability to learn a variety of subject matter contents including skills in the reading and mathematics areas, no superiority as measured by a standard reading achievement test was demonstrated. An important insight gained from this study is that, while a 15-minute structured language program is a valuable aid to a regular preschool curriculum, it cannot be expected to produce much impact if that is not integrated into the total program. Also, the curriculum materials might have produced a more dramatic contrast if the regular program was not already so rich in academic stimulation. Finally, the two volumes of curriculum materials should offer an important resource to the preschool teacher.

TABLE 15

MEANS AND STANDARD DEVIATIONS FOR TESTS GIVEN AT END OF STUDY

(First Wave - Second Grade)

	Experimental (N=18)		Control (N=16)		New Control (N=34)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Stanford Reading Test						
Word Meaning	16.4	7.3	16.7	7.7	17.0	8.1
Percentile	38		38		38	
Paragraph Meaning	24.7	10.2	20.8	11.5	24.4	10.7
Percentile	30		18		24	
Total Reading	41.1	16.4	36.4	19.6	41.4	17.4
Percentile	38		26		38	

(Second Wave - First Grade)

	Experimental (N=29)		Control (N=21)		New Control (N=50)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Cooperative Reading	25.2	10.6	26.5	10.7	24.4	11.3
Grade Equivalent	1.9		2.0		1.8	

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SECTION 2

COMPREHENSIVE EVALUATION BATTERY

UCLA EARLY CHILDHOOD LANGUAGE PROGRAM: TEST BATTERY
(Preschool)

PROGRAM PICTURE READING (INDIVIDUAL)

MATERIALS:	GENERAL PROCEDURE:
Cards	Teacher places cards in front of child, reads written commentary, and records verbal response.

VISUAL	TEACHER COMMENTARY
Boy flying kite, boy losing kite	A. Boy With Kite (WAVE HAND LEFT TO RIGHT) Tell me a story about these pictures.
Girl riding bike, girl falling off, girl crying	B. Girl Riding Bike (WAVE HAND LEFT TO RIGHT) Now tell me a story about these pictures..
	C. Picture Description I'm going to tell you about a picture. You say what I say. (RECORD ANY DEVIATIONS FROM EXPECTED RESPONSE.)
Baby sitting under table	1. The baby is sitting under the table.
Boy talking on telephone	2. The boy is talking on the telephone.
Boy sitting on swing	3. The boy is sitting on the swing. Now you tell me about these pictures.
Boy sitting on car	4.
Girl standing between chairs	5.
Boy playing guitar	6.
Lady standing in front of table	7.
Baby sitting in basket	8.
Man looking under desk	9.
Boy standing by box	10.
Boy digging with shovel	11.

* *

PROGRAM PARALLEL SENTENCE PRODUCTION TEST (INDIVIDUAL)

MATERIALS:	GENERAL PROCEDURE:
Cards	Teacher shows booklet (READ a, POINT TO b), reads written commentary, and records verbal response.

VISUAL	TEACHER COMMENTARY
Cat playing with ball Dog playing with bone	Aa. (POINT TO a) This cat is playing with a ball b. (POINT TO b) This dog is playing with a bone. (POINT TO b) Now you tell me about this picture. (DO NOT PROCEED UNTIL CHILD ATTEMPTS SENTENCE.)
Little boy riding little bike Big boy riding big bike	Ba. (POINT TO a) The little boy is riding a little bike. b. (POINT TO b) The big boy is riding a big bike. (POINT TO b) Now you tell me about this picture. (RECORD ANY DEVIATIONS FROM THE EXPECTED RESPONSE.)
Cat sleeping Dog sleeping	1a. This cat is sleeping. b.
Boy drawing picture Girl painting picture	2a. The boy is drawing a picture. b.
Big hat with many flowers Small hat with one flower	3a. This big hat has many flowers. b.
Doctor Nurse	4a. Some boys grow up to be doctors. b.
Fat lady sitting on little chair Skinny lady sitting on big chair	5a. The fat lady sat on a little chair b.
Elephant eating peanuts Monkey eating bananas	6a. Elephants like to eat peanuts b.
Fork on plate Spoon in cup	7a. The fork is on the plate. b.
Boy, standing up, smiling Girl, sitting down, crying	8a. The boy standing up and smiling is happy. b.

VISUAL	TEACHER COMMENTARY
Birds flying in air	9a. Birds fly in the air.
Fish swimming in water	b.
Little boy holding balloon	10a. The little boy is holding his balloon.
Big girl holding ball	b.
Man lifting big heavy box	11a. The man is lifting a big heavy box.
Lady carrying little light box	b.
Cat jumping into box	12a. The cat jumps into the box.
Dog sitting under table	b.
Night: children sleeping in bed	13a. When it is night, children sleep in bed.
Day: children playing outdoors	b.
Boy skating	14a. This boy likes to skate.
Boys swimming	b.
Summer: trees with leaves	15a. In the summer the trees have leaves.
Winter: trees with no leaves	b.
Boy throwing ball to girl	16a. The boy throws the ball to her.
Girl kicking ball to boy	b.
Boy eating with fork	17a. The boy feeds himself with a fork.
Girl eating with spoon	b.
Girl making bed	18a. This girl is making her bed.
Girl made bed	b.
Girl wearing short dress, shoes	19a. The girl with the short dress is wearing shoes.
Girl wearing long dress, no shoes	b.
All men wearing hats	20a. All of the men are wearing hats.
Some women wearing hats	b.

* *

PROGRAM OPPOSITES (INDIVIDUAL)

MATERIALS:

GENERAL PROCEDURE:
Teacher reads written commentary and records verbal response.

VISUAL	TEACHER COMMENTARY	
	I'm going to tell you some opposites. Listen.	
	Up is the opposite of down. Out is the opposite of in. Now you tell me:	
	1. What is the opposite of day?	(NIGHT)
	2. What is the opposite of big?	(LITTLE)
	3. What is the opposite of dark?	(LIGHT)
	4. What is the opposite of out?	(IN)
	5. What is the opposite of up?	(DOWN)
	6. What is the opposite of top?	(BOTTOM)
	7. What is the opposite of happy?	(SAD)
	8. What is the opposite of young?	(OLD)
	9. What is the opposite of hot?	(COLD)
	10. What is the opposite of empty?	(FULL)

* *

PROGRAM NUMERALS (INDIVIDUAL)

MATERIALS:	GENERAL PROCEDURE:
Blocks (8) Numeral Cards	Teacher reads written commentary, places blocks in front of child, holds up numeral cards in specified order, and records verbal response.

VISUAL	TEACHER COMMENTARY
	A. Counting by Rote Count for me. (RECORD ALL NUMBERS NAMED REGARDLESS OF ORDER; NOTE IF ALL NUMBERS IN CORRECT ORDER.)

* *

	B. Counting Blocks
8 blocks	1. Give me two blocks. (REPLACE BLOCKS SO THAT CHILD ALWAYS SELECTS FROM EIGHT BLOCKS.)
	2. Give me four blocks.
	3. Give me one block.
	4. Give me three blocks.
	5. Give me five blocks.

* *

(NUMERAL CARDS)	C. Naming Numerals
2 3	(HOLD UP NUMERAL CARDS IN SPECIFIED ORDER)
4 5	What numeral is this?
3 2	
1 4	
5 1	

* *

PROGRAM ANIMALS AND HOMES (INDIVIDUAL)

MATERIALS:
Teacher Booklet
Animal, Home Cards

GENERAL PROCEDURE:
Teacher shows booklet, reads written commentary, holds up cards in specified order, records verbal response and card placement.

VISUAL	TEACHER COMMENTARY
	A. Home Environment Language Booklet
Keyhole, roof, walls	1a. Point to the top of the house. b. What is it called?
Door, window, keyhole	2a. Point to what we go in and out of. b. What is it called?
Roof, key, walls	3a. Point to the sides of the house. b. What are they called?
Keyhole, key, window	4a. Show me where you put the key to open the door. b. What is it called?
Roof, walls, window	5a. Show me what lets sunshine into the house. b. What is it called?
Steps, doorknob, floor	6a. Point to what we turn to open the door. b. What is it called?
Floor, window, door	7a. Show me what we walk on. b. What is it called?
Window, steps, key	8a. Show me what you use to lock the door. b. What is it called?
Hinge, key, roof	9a. Point to what keeps the rain out. b. What is it called?
Roof, window, doorknob	10a. Point to what lets us look inside. b. What is it called?

* *

VISUAL	TEACHER COMMENTARY		
	B. Naming Animals and Homes (HOLD UP ANIMAL CARDS IN SPECIFIED ORDER)		
Bear	1a. What is this called?	1b. And what is the name of his home?	(CAVE)
Boy	2a. What is this?	2b. What is the name of his home?	(HOUSE)
Fish	3a. What is this?	3b. What is the name of his home?	(WATER)
Bird	4a. What is this?	4b. What is the name of his home?	(NEST)
Spider	5a. What is this?	5b. What is the name of his home?	(WEB)
Snake	6a. What is this?	6b. What is the name of his home?	(HOLE)
Beaver	7a. What is this?	7b. What is the name of his home?	(NEST)

* *

C. Matching Animals to Homes

(PLACE HOME CARDS ON TABLE IN NUMERICAL ORDER IN FRONT OF CHILD, HAND THE DECK OF ANIMAL CARDS TO CHILD)

Put these animals in their homes.

(1)nest	(2)hole	(3)water	(4)house	(5)web	(6)cave	(7)nest
(BIRD)	(SNAKE)	(FISH)	(BOY)	(SPIDER)	(BEAR)	(BEAVER)

* *

PROGRAM PROBLEM SOLVING (INDIVIDUAL)

MATERIALS:	GENERAL PROCEDURE:
Teacher Booklet Sequencing Board Sequencing Cards	Teacher reads written commentary, shows booklet, and records verbal response; places sequencing cards in specified order and records card placement.

VISUAL		TEACHER COMMENTARY	
		A. Same and Not Same Booklet	
Football, football		A. Here are two pictures. Are they the same? Yes, they are the same. Now you tell me. Are they the same?	
Doll, cake		B. Are these the same? No, they are not the same. Now you tell me. Are these the same?	
Hat, hat		1. Are these the same?	(YES)
Chicken, ice cream cone		2. Are these the same?	(NO)
Rectangle cut diagonally, rectangle cut vertically		3. Are these the same?	(NO)
Circle with dot, circle with dot		4. Are these the same?	(YES)
B	B	5. Are these the same?	(YES)
M	R	6. Are these the same?	(NO)
H	A	7. Are these the same?	(NO)
S	S	8. Are these the same?	(YES)
sw	wr	9. Are these the same?	(NO)
an	an	10. Are these the same?	(YES)

* *

VISUAL	TEACHER COMMENTARY
	B. Sequencing 1 (PLACE CARDS IN FRONT OF CHILD IN ORDER SPECIFIED; PLACE SEQUENCE BOARD ABOVE CARDS)
Fish, bell, train	1. The pictures go on this board. Find the train. Put the train first. (POINT TO FIRST SPACE ON BOARD) Put it here. Put the fish next to the train. Put the bell last.
Tree, truck, bird	2. Put the bird first. Put the truck next. Put the tree last.
House, fork, chair, cat	3. Put the chair first. Put the fork next. Put the cat next. Put the house last.
Flower, shoe, boy, rabbit	4. Put the flower first. Put the boy next. Put the rabbit next. Put the shoe last.
* *	* *
	C. Sequencing 2 (PLACE CARDS IN FRONT OF CHILD IN ORDER SPECIFIED)
Boy placing apple core on plate (3), boy taking bite from apple (2), boy reaching for whole apple (1)	1. This is a story of a boy eating an apple. Give me the picture that shows what happens first. Now give me the picture that shows what happens next. Now give me the picture that shows what happens last.
Candle burned mid-way (2), tall candle newly lit (1), small candle burning out (3)	2. This is a story of a burning candle. Give me the picture that shows what happens first. Now give me the picture that shows what happens next. Now give me the picture that shows what happens last.

* *

PROGRAM COLOR (INDIVIDUAL)

MATERIALS:
Color Squares, Cards
Teacher Booklet

GENERAL PROCEDURE:
Teacher reads written commentary, presents squares and cards in specified order, shows booklet, and records verbal response.

VISUAL	TEACHER COMMENTARY
(COLOR SQUARES) Blue Green Red Orange Yellow Brown Black Purple White	A. Labeling Colors (HOLD UP COLOR SQUARES IN ORDER SPECIFIED) What color is this?
* * * * * * * * * * * * * * * * *	* *
	B. Color Selection
Tricycles: blue, orange, yellow	1. Point to the blue tricycle.
Birds: green, yellow, red	2. Point to the red bird.
Engines: orange, yellow, purple	3. Point to the yellow fire engine.
Socks: blue, black, orange	4. Point to the black sock.
Bats: white, brown, red	5. Point to the white bat.
Kites: red, purple, green	6. Point to the green kite.
Phones: red, white, orange	7. Point to the orange telephone.
Teapots: white, brown, black	8. Point to the brown teapot.
Mice: purple, green, red	9. Point to the purple mouse.
* * * * * * * * * * * * * * * * *	* *

VISUAL	TEACHER COMMENTARY
	C. Color Blending Booklet
Red/Yellow Red, orange, purple	1. (POINT TO YELLOW) Put your finger here. (POINT TO RED) Now put your finger here. (POINT TO BOTH TOP COLORS) If you put these two colors together, what color would you get? (RUN FINGER OVER BOTTOM COLORS) Point to it.
Yellow/Blue Green, orange, blue	2. (POINT TO YELLOW) Put your finger here. (POINT TO BLUE) Now put your finger here. (POINT TO TOP COLORS) If you put these two colors together, what color at the bottom would you get? Point to it.
Red/Blue Green, blue, purple	3. (POINT TO TOP COLORS) Look at these two colors. If you put these two colors together, what color would you get? Point to it.
Blue/Yellow Orange, yellow, green	4. (POINT TO TOP COLORS) Look at these two colors. If you put these two colors together, what color would you get? Point to it.
Red/Yellow Orange, green, yellow	5. (POINT TO TOP COLORS) If you put these two colors together, what color would you get? Point to it.
Blue/Red Red, purple, orange	6. (POINT TO TOP COLORS) If you put these two colors together, what color would you get? Point to it.

* *

PROGRAM NUMERALS (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets Marking Pens, Cards	Teacher reads written commentary, holds up cards, and supervises booklet marking.

VISUAL	TEACHER COMMENTARY
	D. Selecting Number of Objects (HAND OUT BOOKLETS AND MARKING PENS.)
1 fish, 2 fish, 4 fish	1. Mark the set that has two fish.
4 birds, 5 birds, 2 birds	2. Mark the set that has four birds.
2 turtles, 1 turtle, 3 turtles	3. Mark the set that has one turtle.
2 eggs, 4 eggs, 5 eggs	4. Mark the set that has five eggs.
5 cups, 3 cups, 4 cups	5. Mark the set that has three cups.
3 cars, 4 cars, 1 car	6. Mark the set that has one car.
3 dogs, 2 dogs, 5 dogs	7. Mark the set that has three dogs.
2 lamps, 3 lamps, 5 lamps	8. Mark the set that has two lamps.
4 cats, 2 cats, 5 cats	9. Mark the set that has five cats.
3 dolls, 4 dolls, 2 dolls	10. Mark the set that has four dolls.
* * * * * * * * * * * * * * * * * *	* *
	E. Selecting Numerals
1 3 4	1. Mark the three.
5 2 3	2. Mark the five.
4 1 2	3. Mark the two.
1 3 5	4. Mark the one.
2 1 4	5. Mark the four.

* *

VISUAL	TEACHER COMMENTARY
	F. Selecting Objects for Visually Presented Numerals
1 fish, 2 fish, 4 fish	1. (HOLD UP 1) Look at this numeral. Mark the set with this many fish.
4 birds, 5 birds, 2 birds	2. (5) Look at this numeral. Mark the set with this many birds.
2 turtles, 1 turtle, 3 turtles	3. (3) Look at this numeral. Mark the set with this many turtles.
2 eggs, 4 eggs, 5 eggs	4. (2) Look at this numeral. Mark the set with this many eggs.
5 cups, 3 cups, 4 cups	5. (5) Look at this numeral. Mark the set with this many cups.
3 cars, 4 cars, 1 car	6. (4) Look at this numeral. Mark the set with this many cars.
3 dogs, 2 dogs, 5 dogs	7. (5) Look at this numeral. Mark the set with this many dogs.
2 lamps, 3 lamps, 5 lamps	8. (3) Look at this numeral. Mark the set with this many lamps.
4 cats, 2 cats, 5 cats	9. (4) Look at this numeral. Mark the set with this many cats.
3 dolls, 4 dolls, 2 dolls	10. (2) Look at this numeral. Mark the set with this many dolls.
* * * * * * * * * * * * * * * * * *	* *
	G. Selecting Numeral and How Many?
2 boats: 1 2 3 4 5	1. Count the boats. Now mark the numeral that tells how many.
5 dogs: 1 2 3 4 5	2. Count the dogs. Now mark the numeral that tells how many.
1 house: 1 2 3 4 5	3. Count the houses. Now mark the numeral that tells how many.
4 butterflies: 1 2 3 4 5	4. Count the butterflies. Mark the numeral that tells how many.
2 birds: 1 2 3 4 5	5. Mark the numeral that tells how many birds.
3 fish: 1 2 3 4 5	6. Mark the numeral that tells how many fish.
5 ducks: 1 2 3 4 5	7. Mark the numeral that tells how many ducks.
4 cats: 1 2 3 4 5	8. Mark the numeral that tells how many cats.
1 telephone: 1 2 3 4 5	9. Mark the numeral that tells how many telephones.
3 bears: 1 2 3 4 5	10. Mark the numeral that tells how many bears.
* * * * * * * * * * * * * * * * * *	* *

VISUAL	TEACHER COMMENTARY
	H. More Than, Less Than, Same Number
1 rabbit 3 rabbits, 1 rabbit	1. Look here. (POINT TO TOP BOX) The big box has one rabbit. (POINT TO BOTTOM BOXES) Mark the small box that has the same number.
3 tops 5 tops, 1 top	2. Look here. (POINT) The big box has three tops. Mark the small box that has more than three.
4 hammers 5 hammers, 2 hammers	3. Look here. (POINT) The big box has four hammers. Mark the small box that has less than four.
2 elephants 2 elephants, 1 elephant	4. The big box has two elephants. Mark the small box that has the same number.
5 balls 3 balls, 5 balls	5. The big box has five balls. Mark the small box that has less than five.
2 keys 2 keys, 3 keys	6. The big box has two keys. Mark the small box that has more than two.

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PROGRAM PROBLEM SOLVING (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets Marking Pens	Teacher reads written commentary and supervises booklet marking.

	D. Negation
Truck, airplane	1. See these two pictures. (POINT) This is a truck, and this is an airplane. Which one is not a truck? Mark it.
Block, pig	2. Which one is not a pig? Mark it.
Doll, boat	3. Which one is not a doll? Mark it.
Clock, dog	4. Which one is not a dog? Mark it.
Umbrella, sock	5. Which one is not a sock? Mark it.
Bear, tiger	6. Which one is not a bear? Mark it.

* *

	E. Disjunctive Argument
Boy climbing stile, boy holding kite	1. Now I'm going to tell you a story about these two pictures. Here are two boys. One of these boys is Charlie. Charlie is not holding a kite. Which one is Charlie? Mark it.
Elephant holding pail, elephant holding umbrella	2. Look at the two elephants. One of them is Sally. Sally is not holding an umbrella. Which one is Sally? Mark it.
Cowboy, fireman	3. Here are two men. One of them is Fred. Fred is not a cowboy. Which one is Fred? Mark it.
Bird flying, bird sitting in nest	4. See the two birds. One of them is not flying. Mark the bird that is not flying.
Pig reading book, pig crying	5. Look at the two pigs. One of them is Peter. Peter is not crying. Find Peter. Mark it.
Boy eating, boy getting book	6. See the two boys. One of them is Johnny. Johnny is not eating the corn. Which boy is Johnny? Mark it.

* *

VISUAL	TEACHER COMMENTARY
	F. Joint Denial
Hot dog, television, cake	1. Find something that you cannot eat. Mark it.
Boy climbing, boy sitting, man riding horse	2. Find someone who is not sitting. Mark it.
Table, flower, boy	3. Find something that is not a flower and is not a table. Mark it.
Lamp, key, knife	4. Find something that cannot open a door and cannot cut. Mark it.
Glass, shirt, frog	5. Find something that cannot jump and cannot hold water. Mark it.
Ice cream, horse, telephone	6. Find something that is not cold and cannot see. Mark it.
Coffee pot, cat on table, boy	7. Find something that is not on top of a table and cannot talk. Mark it.
Car, hat, cat under table.	8. Find something that is not under a table and you cannot ride in it. Mark it.
Cup, duck, airplane	9. Find something that cannot swim and cannot fly. Mark it.
Cap, tree, stove	10. Find something that you cannot wear and that does not grow. Mark it.

* *

	G. Ordering
Cake, hat, foot	1. Mark the picture that is first.
Scissors, cup, toaster	2. Mark the picture that is last.
House, ball, rabbit	3. Mark the picture that is in the middle.
Flag, basket, bird	4. Mark the picture that is first.
Clock, bicycle, shoe	5. Mark the picture that is in the middle.
Telephone, pail, ice cream cone	6. Mark the picture that is last.

* *

VISUAL	TEACHER COMMENTARY
	H. Categories
Carrots Banana, bed, drum	A. You're going to find some pictures that go together. (POINT) The top picture shows some carrots. Carrots are food. Look at the pictures on the bottom (POINT TO 3 CHOICES). Which bottom picture goes with the carrots? Mark it. (CONFIRM OR CORRECT BY POINTING) The banana goes with the carrots. They are food.
Chair Sofa, truck, violin	1. (POINT) Look at the chair. Find the picture that goes with the chair. (RUN FINGER OVER 3 CHOICES) Mark it.
Shoes Bicycle, book, sock	2. (POINT) Look at the shoes. (INDICATE 3 CHOICES) Mark the picture that goes with it.
Bicycle Monkey, wagon, bread	3. Look at the bicycle. Mark the picture that goes with it.
Train Car, turtle, apple	4. Look at the train. Mark the picture that goes with it.
Shirt Television, pants, ladder	5. Look at the shirt. Mark the picture that goes with it.
Stove Bicycle, butterfly, refrigerator	6. Look at the stove. Mark the picture that goes with it.
Cow Buggy, pig, football	7. Look at the cow. Mark the picture that goes with it.
Boy sitting on ball Boy sitting on chair, girl standing, cow lying on ground	8. Look at the boy sitting. Mark the picture that goes with it.
Frog Umbrella, goat, clock	9. Look at the frog. Mark the picture that goes with it.
Boat Pears, basket, man riding horse	10. Look at the boat. Mark the picture that goes with it.

* *

PROGRAM SHAPES (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets Marking pens	Teacher reads written commentary and supervises booklet marking.

VISUAL	TEACHER COMMENTARY
	A. SHAPES BOOKLET
	(HAND OUT STUDENT BOOKLETS AND MARKING PENS)
Circle, triangle, square	1. Find the circle. Mark it.
Circle, square, triangle	2. Find the triangle. Mark it.
Square, triangle, circle	3. Find the square. Mark it.
Boy holding balloon, tree, chair	4. Find the picture with a circle in it. Mark it.
Airplane, frog, truck with square body	5. Find the picture with a square in it. Mark it.
Dog, pennant, car	6. Find the picture with a triangle in it. Mark it.

* *

PROGRAM LETTER RECOGNITION (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets Marking pens	Teacher reads written commentary and supervises booklet marking.

VISUAL			TEACHER COMMENTARY
			A. Lower Case Letters
k	c	o	1. Find the letter "k." Mark it.
t	m	h	2. Find the letter "h." Mark it.
z	f	g	3. Find the letter "f." Mark it.
a	j	b	4. Find the letter "j." Mark it.
t	e	d	5. Mark the "t."
x	c	e	6. Mark the "e."
w	p	r	7. Mark the "w."
n	y	d	8. Mark the "d."
u	s	i	9. Mark the "s."
v	r	l	10. Mark the "l."

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VISUAL			TEACHER COMMENTARY
			B. Upper Case Letters
D	B	U	1. Find the letter "U." Mark it.
M	E	P	2. Find the letter "E." Mark it.
A	O	N	3. Find the letter "N." Mark it.
K	S	X	4. Find the letter "K." Mark it.
G	H	L	5. Mark the "G."
J	I	C	6. Mark the "I."

VISUAL			TEACHER COMMENTARY
Q	T	W	7. Mark the "W."
R	C	Z	8. Mark the "R."
O	A	C	9. Mark the "A."
V	F	N	10. Mark the "F."

* * *

			C. Vocabulary
fig	top	dad	1. Find the word "top." Mark it.
car	beg	cam	2. Find the word "cam." Mark it.
cab	mat	not	3. Find the word "not." Mark it.
hop	ape	the	4. Find the word "hop." Mark it.
boy	hen	tom	5. Mark "hen."
sat	sop	tag	6. Mark "sat."
bed	tot	bag	7. Mark "bed."
toy	fly	had	8. Mark "had."
rug	dig	got	9. Mark "dig."
fat	hit	end	10. Mark "fat."
bit	Jam	Bob	11. Mark "Bob."
sis	Tom	Sue	12. Mark "Tom."

* * *

VISUAL	TEACHER COMMENTARY
	D. Rhyming
Pig, boat, hat	1. Let's name these pictures. (POINT TO EACH) This is a pig, boat, and hat. Now I'm going to say a word. Listen carefully. "Big." You say it. "Big." Now you mark the picture that ends with the same sound as "big."
Shoe, chair, fly	2. Listen. (POINT) Shoe, chair, fly. Now say the word "high." Mark the picture that ends with the same sound.
Cat, horn, bear	3. Listen. (POINT) Cat, horn, bear. Now you say the word "mat." Mark the picture that ends with the same sound.
Tree, man, bike	4. Listen. (POINT) Tree, man, bike. Say the word "tan." Now mark the picture that ends with the same sound.
Snake, bed, doll	5. Listen. (POINT) Snake, bed, doll. Say the word "bread." Mark the picture that ends with the same sound.
Lion, dog, hat	6. Listen. (POINT) Lion, dog, hat. Say the word "rat." Now mark the picture that ends with the same sound.

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UCLA EARLY CHILDHOOD LANGUAGE PROGRAM: TEST BATTERY
(Kindergarten)

PROGRAM NUMERALS (INDIVIDUAL)

MATERIALS:	GENERAL PROCEDURE:
Numeral Cards Teacher Booklet	Teacher reads written commentary, holds up numeral cards in specified order, shows booklet, and records verbal response.

VISUAL	TEACHER COMMENTARY
	A. Counting (SAME AS PRESCHOOL TEST BATTERY, NUMERALS A.)
(NUMERAL CARDS) 6 9 8 8 9 6 7 10 10 7	B. Identifying Numerals (HOLD UP NUMERAL CARDS IN SPECIFIED ORDER) What numeral is this?
	C. Word Problems: Add and Subtract 1. There are three birds sitting on the fence. If two more birds come to sit on the fence, tell me how many birds will there be altogether? (5) 2. There are eight cookies on the plate. If Johnny eats one of them, how many cookies will there be? (7) 3. Here are five eggs. If two of them hatch, how many eggs have not hatched? (3)

VISUAL	TEACHER COMMENTARY
	4. Five children are wearing party hats. If two more children put on hats, how many children will be wearing party hats? (7) 5. There are four flowers in the glass. Mary is going to put one more flower in the glass. Tell me how many flowers will there be altogether? (5) 6. Six kittens are playing. If three of them go away, how many kittens will be left? (3)

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PROGRAM READING (INDIVIDUAL)

MATERIALS:	GENERAL PROCEDURE:
Cards Teacher Booklet	Teacher reads written commentary, holds up cards in order specified, shows booklet, and records verbal response.

VISUAL	TEACHER COMMENTARY
	A. Alphabet Say the alphabet for me. You may sing it if you wish. (RECORD ALL LETTERS NAMED REGARDLESS OF ORDER. DRAW LINE AFTER LAST LETTER NAMED IN CORRECT ORDER.)

* *

(LETTER CARDS) a h r e b m s i c n t d f p o	B. Letter Recognition (HOLD UP CARDS IN ORDER SPECIFIED) What letter is this?

* *

dad had a bat the man can pet the fat cat pat the tan cat the lad can get the fan the man and dan met the rat set the pan and the van on the mat yes and no	C. Word Pronounciation and Recognition Booklet (POINT TO EACH WORD IN SENTENCE) When I point to the words, you read them.

* *

PROGRAM LOGIC (INDIVIDUAL)

MATERIALS:	GENERAL PROCEDURE:
Teacher Booklet Blocks, Spinners, Cards	Teacher reads written commentary, shows booklet, presents blocks, spinners, cards, and records verbal response.

VISUAL	TEACHER COMMENTARY
	A. Logic Booklet (HOLD UP BOOKLET) I'm going to ask you some questions about the pictures in this book. Sometimes you will answer "yes," sometimes you will answer "no," and sometimes you do not have enough information to tell for sure, so you will answer "can't tell." What do you say if you do not have enough information?..."Can't tell."
Bird	1. Is this a rabbit? (NO)
Elephant holding pail	2. Is the elephant holding a pail? (YES)
Closed truck	3. Are there toys in the truck? (CAN'T TELL)
Opaque sprinkling can	4. Lisa waters the flowers with this can. Does the can have water in it now? (CAN'T TELL)
Boy climbing stairs	5. Jimmy is going upstairs to see his sister. Is Jimmy going upstairs? (YES)
Opaque paperbag	6. There are no apples in this bag. Are there apples in this bag? (NO)
* *	* *
	B. Blocks
"All blue" block	1. (LIFT ALL BLUE BLOCK AND ROTATE IN HAND SO CHILD SEES ALL SIDES) This block has all blue sides. If I throw this block will there be a blue side on top? (YES)
"Some blue" block	2. (ROTATE SOME BLUE BLOCK IN HAND) This block has some blue sides. If I throw this block will there be blue on top? (CAN'T TELL)
"No blue" block	3. (ROTATE NO BLUE BLOCK) Here is a block with no blue sides. If I throw this block will there be blue on top? (NO)
* *	* *

VISUAL	TEACHER COMMENTARY
"All red" spinner "All yellow" spinner "Yellow and red" spinner	C. Spinners Here are some spinners. (POINT) This spinner has all red on it. (POINT) This spinner has no red. (POINT) This spinner has some red. 1. Now I always want to get red. Point to the spinner I should use. (RED) 2. Now I never want to get red. Point to the spinner I should use. (YELLOW) 3. Now I sometimes want to get red. Point to the spinner I should use. (RED AND YELLOW)
Pink cards: Clowns Purple cards: Clown, shoe, flower, fish Green Cards: Bird, mouse, basket, chair	D. Cards Here is a different game. Look at these cards. (SHOW BLANK SIDE OF ALL CARDS SPREAD OUT.) All the cards have pictures on the other side (TURN CARDS OVER SO CHILDREN HAVE GLIMPSE OF PICTURES). Here are some clowns, a bird, a flower, and other pictures. (TURN CARDS OVER SO PICTURES ARE NOT VISIBLE.) 1. Listen carefully. All the pink cards have clowns on them. (POINT TO PINK CARD) Does this pink card have a clown on the other side? (YES) 2. None of the green cards have clowns on them. (POINT TO GREEN CARD) Does this green card have a clown on the other side? (NO) 3. Some of the purple cards have clowns on them. (POINT TO PURPLE CARD) Does this purple card have a clown on the other side? (CAN'T TELL)

PROGRAM SEQUENCING (INDIVIDUAL)

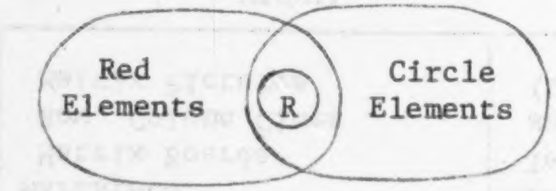
MATERIALS:	GENERAL PROCEDURE:
Five sets of cards Sequence Boards	Teacher places cards in front of child in order specified and sequence board above cards; reads written commentary, and records card placement.

VISUAL	TEACHER COMMENTARY
	A. Meaningful Sequences
Tall tree with few branches and leaves (3), baby tree (1), tall tree with many branches and leaves (4), short tree (2)	1. Here are four pictures that tell a story about how a tree grows. The pictures are all mixed up. You can put them in the right place so they tell a story. Which picture comes first? Pick it up and put it here (POINT TO FIRST BOX ON BOARD). Now you finish the story. Put the other pictures here (RUN FINGER ALONG BOXES).
Boy beginning to trip on rock (2), boy on ground, crying (4), boy running towards rock (1), boy falling over rock (3)	2. Here are some pictures that tell a story about a boy running. Which picture comes first? Pick it up and put it here (POINT). Now you finish the story. Put the other pictures here (POINT).
Boy walking up to ice cream truck (2), boy paying, getting cone (3), boy eating cone (4), boy stopping ice cream truck (1)	3. Here are some pictures that tell a story about a boy who buys some ice cream with a dime. Which picture comes first? Put it here (POINT) and finish the story.
Man standing by completed doghouse (4), man nailing walls to floor (3), man carrying lumber and tools (1), man hammering floor (2)	4. Here are some pictures of a man who wants to build a doghouse. Which picture comes first? Now finish the story.
Falling apple close to ground (3), apple beginning to fall (2), apple on tree (1), apple on ground (4)	5. Here are some pictures of what happens to an apple as it falls from a tree. Put the first picture here (POINT), and finish the story.

* *

PROGRAM MATH-SCIENCE (INDIVIDUAL)

MATERIALS:	GENERAL PROCEDURE:
Yellow pencil; Green car in bag; Circles: 2 blue, 1 red, 1 yellow; Squares: 1 red, 1 yellow; Triangles: 2 red, 1 blue; 2 small loops	Teacher holds up objects, reads written commentary, and records verbal response; supervises subset and intersection construction and records its placement.

VISUAL	TEACHER COMMENTARY
	A. Sets
Yellow pencil	1. (HOLD UP) Is this pencil an object?
	2. One property of this object is that it is thin. Tell me two more properties of this object.
	3. Name two more objects you can see around you.
Green car in paper bag	4. (HOLD UP BAG) I have a toy in this bag. Is it red?
	5. You can't tell. What do you need to tell?
	6. You need more information. How can you get more information?
2 blue, 1 yellow circles; 1 red, 1 yellow squares; 2 red, 1 blue triangles; 2 small loops	7. (PLACE 8 SHAPES RANDOMLY ON TABLE; HAND CHILD LOOPS) a. Here are two loops. I want you to make a red subset in one loop and a circle subset in the other. Put the loops on the table and put the elements inside the loops to make a red subset and a circle subset. (ALLOW SUFFICIENT TIME TO COMPLETE)
1 red circle 	b. (HAND CHILD RED CIRCLE) Here is another element. Where does it go? (RECORD VERBAL RESPONSE) c. Put it where it belongs.

* *

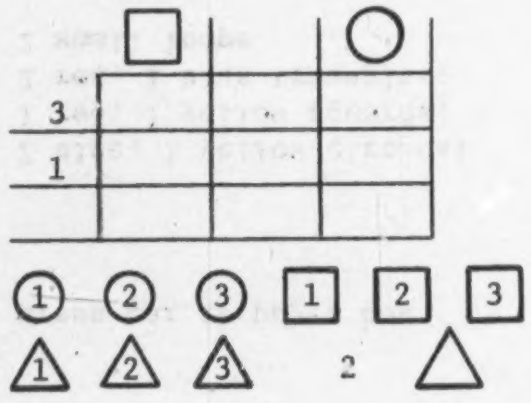
PROGRAM MATRIX (INDIVIDUAL)

MATERIALS:
Matrix Boards
Row, Column Clues
Matrix Pictures

GENERAL PROCEDURE:
Teacher reads written commentary, demonstrates, supervises and records matrix picture placement. (DO NOT ADMINISTER UNTIL CHILD HAS TAKEN GROUP MATRIX TEST.)

VISUAL

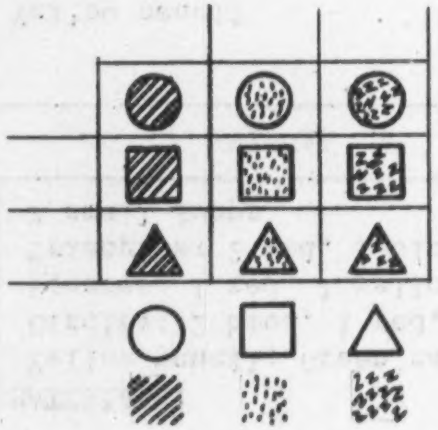
TEACHER COMMENTARY



A. Matrix: Form I

1. (PLACE MATRIX BOARD IN FRONT OF CHILD) This is a matrix. We're going to put some pictures in this matrix. First we put in the clue pictures. (HOLD UP 2) Watch me and I'll put this clue in for you.
2. (HAND CHILD TRIANGLE) Put this clue here (POINT).
3. (SPREAD 9 PICTURES IN FRONT OF CHILD) Now you put the pictures where they belong. Remember, look at all the clues. Find the right place for each picture.

* *



B. Matrix: Form II

1. (PLACE MATRIX BOARD IN FRONT OF CHILD) Here is a matrix with all the pictures filled in (RUN FINGER ALONG EMPTY ROW AND COLUMN CLUE AREAS) but the clues are missing.
2. (PLACE CLUE CARDS IN FRONT OF CHILD) Here are your clue pictures. Look at all the pictures in the matrix. Find the right place for each clue and put it in.

* *

PROGRAM MULTIPLE CATEGORIZATION TEST (INDIVIDUAL)

MATERIALS:
Pictures

The Multiple Categorization Test was developed by Dr. Joseph Edwards and consists of two pages of pictures. In the center of each page is a picture which is surrounded by eight or nine pictures, all of which are related to the central one in some way. The instructions are as follows:

> Look at the picture in the circle. (POINT TO FIRST PICTURE AT TOP OF PAGE) Now look at this picture. Does it go with the one in the circle?
>
> (IF CHILD SAYS "YES") Tell me why.
>
> (IF CHILD SAYS "NO" GO TO NEXT PICTURE) Now look at the next picture (POINT IF NECESSARY). Does it go with the picture in the circle?
>
> (IF CHILD SAYS "YES") Why?

Continue in this fashion for each of the eight pictures on the page, recording the child's verbal responses. Record verbatim the child's reasons for his matches. If child cannot give the reason for his match — there should be very few of these — prompt once. (Say: "Try to tell me why it goes with it.") If this does not help, go on to next item.

* *

PROGRAM VISUAL DISCRIMINATION INVENTORY* (INDIVIDUAL)

MATERIALS:
Teacher Booklet
Model Cards

The Visual Discrimination Inventory, a standarized instrument, developed by the UCLA Early Childhood Language Project, was used as a pretest measure. It was administered individually and required about 10 minutes per child. The child was seated next to the examiner, who read the verbal statement for each item. These are not timed responses, but the examiner is instructed to maintain as rapid a pace as possible without pushing the child.

The blue pages (A-Z) comprise a training program. Items E through J require the use of a set of Model Cards. From Item K on, no model cards are used. For Items Q-Z, the examiner indicates the correct answer and reads the "Feedback" statement. Before starting the test itself, the child must answer correctly the five criterion items (V-Z). If he misses any of them, Items Q-Z are repeated. If after two repetitions the child does not correctly answer the five criterion items (V-Z), the test is discontinued. Performance on these training items is not recorded.

The 33 test items are on white cards. No corrective feedback is given except as indicated for Items 19 and 20. The child's response is recorded by placing a check mark in the appropriate answer box.

* *

PROGRAM NUMERALS (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets Marking Pens, Cards	Teacher reads written commentary, holds up cards, and supervises booklet marking.

VISUAL				TEACHER COMMENTARY
				D. Counting with Objects Booklet (HAND OUT BOOKLETS AND MARKING PENS)
Trees:	10	6	8	1. Mark the set with eight.
Hats:	7	6	5	2. Mark the set with seven.
Blocks:	6	10	9	3. Mark the set with ten.
Hearts:	6	10	5	4. Mark the set with six.
Stars:	4	9	7	5. Mark the set with nine.

* *

VISUAL				TEACHER COMMENTARY
				E. Selecting Objects for Visually Presented Numerals (HOLD UP NUMERAL CARDS)
Dogs:	4	6	7	1. (HOLD UP 6) Look at this numeral. Mark the set that has this many dogs.
Apples:	5	7	9	2. (9) Look at this numeral. Mark the set that has this many apples.
Birds:	8	10	5	3. (8) Look at this numeral. Mark the set that has this many birds.
Eggs:	4	9	7	4. (7) Look at this numeral. Mark the set that has this many eggs.
Dogs:	10	6	8	5. (10) Look at this numeral. Mark the set that has this many dogs.
Fish:	7	6	5	6. (6) Look at this numeral. Mark the set that has this many fish.
Flowers:	6	10	7	7. (7) Look at this numeral. Mark the set that has this many flowers.
Apples:	10	9	5	8. (10) Look at this numeral. Mark the set that has this many apples.
Mice:	4	7	8	9. (8) Look at this numeral. Mark the set that has this many mice.
Balloons:	6	9	7	10. (9) Look at this numeral. Mark the set that has this many balloons.

* *

VISUAL	TEACHER COMMENTARY
	F. Counting Objects and Selecting Numerals Booklet
7 bears: 6 7 8 9 10	1. Count the bears. Mark the numeral that tells how many.
10 dogs: 6 7 8 9 10	2. Count the dogs. Mark the numeral that tells how many.
6 airplanes: 6 7 8 9 10	3. Count the airplanes. Mark the numeral that tells how many.
9 birds: 6 7 8 9 10	4. Count the birds. Mark the numeral that tells how many.
8 butterflies: 6 7 8 9 10	5. Count the butterflies. Mark the numeral that tells how many.
10 apples: 6 7 8 9 10	6. Count the apples. Mark the numeral that tells how many.
8 turtles: 6 7 8 9 10	7. Mark the numeral that tells how many turtles.
9 balloons: 6 7 8 9 10	8. Mark the numeral that tells how many balloons.
6 babies: 6 7 8 9 10	9. Mark the numeral that tells how many babies.
7 cats: 6 7 8 9 10	10. Mark the numeral that tells how many cats.
* * * * * * * * * * * * * * * * * *	* *
	G. Number Problems: Add and Subtract Booklet
8 candles on cake 3 candles, 10 candles, 6 candles	1. (POINT TO TOP PICTURE) There are eight candles on the birthday cake. Johnny takes away two. (POINT TO BOTTOM PICTURES) Mark the picture that shows how many candles will be left on the cake.
5 flowers in vase 8 flowers, 2 flowers, 4 flowers	2. (POINT TO TOP) There are five flowers in the vase. Betty adds three more. (POINT TO BOTTOM) Mark the picture that shows how many flowers will be in the vase.
10 candies. 2 candies, 5 candies, 8 candies	3. (POINT) Johnny has ten candy canes. He gives five to his brother. (POINT TO BOTTOM) Mark the picture that shows how many candy canes he will have left.
4 cookies in jar 7 cookies, 4 cookies, 1 cookie	4. (POINT) There are four cookies in the jar. If Johnny adds three more, how many cookies will be in the jar? Mark it.

VISUAL	TEACHER COMMENTARY
3 buttons on dress 1 button, 5 buttons, 6 buttons	5. There are three buttons on this dress. If Mommy adds two more, how many buttons will be on this dress? Mark it.
5 fish in bowl 6 fish, 2 fish, 4 fish	6. There are five fish in the fishbowl. If Tom takes one away, how many fish will be left in the fishbowl? Mark it.
* * * * * * * * * * * * * * * * * *	* *
	H. Selecting Numerals Booklet
4 6 8	1. Mark the numeral six.
3 2 9	2. Mark the numeral nine.
7 4 2	3. Mark the numeral seven.
10 5 8	4. Mark the numeral ten.
7 8 9	5. Mark the numeral nine.
3 8 5	6. Mark the numeral eight.
7 1 9	7. Mark the numeral seven.
5 6 2	8. Mark the numeral six.
4 6 10	9. Mark the numeral ten.
8 6 5	10. Mark the numeral eight.
* * * * * * * * * * * * * * * * * *	* *
	I. More Than, Less Than, Same Number Booklet
6 houses 6 apples, 9 buttons, 5 cats	1. (POINT TO TOP SET) This set has six houses. (RUN FINGER ACROSS BOTTOM SETS) Mark the bottom set that has more than six.
8 knives 4 fish, 9 balls, 8 cats	2. (POINT TO TOP) This set has eight knives. Mark the bottom set that has the same number.

VISUAL	TEACHER COMMENTARY
7 ducks 5 airplanes, 9 cats, 7 girls	3. (POINT) This set has seven ducks. Mark the bottom set that has more than seven.
10 airplanes 10 circles, 8 bananas, 11 balloons	4. (POINT) This set has ten airplanes. Mark the bottom set that has less than ten.
9 circles 9 saws, 5 cats, 8 ducks	5. (POINT) This set has nine circles. Mark the bottom set that has the same number.
8 matches 8 mice, 9 dolls, 4 houses	6. (POINT) This set has eight matches. Mark the bottom set that has more than eight.

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PROGRAM MATH-SCIENCE (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets, Marking pens Square, triangle, paper clip on Set Card A	Teacher reads written commentary, holds up set card, and supervises booklet marking.

VISUAL	TEACHER COMMENTARY
Set A: [square, triangle, clip]	B. Sets and Subsets (HOLD UP CARD) This is Set A. Now open your booklet to page one.
[clip, triangle, rectangle] yes no	1. (POINT) Is this a picture of Set A? If the answer is "yes," mark the word "yes" (POINT). If the answer is "no," mark the word "no" (POINT).
[triangle, clip, square] yes no	2. Does this represent Set A? If the answer is "yes," mark "yes" (POINT). If the answer is "no," mark "no" (POINT).
[circle, square, triangle] yes no	3. Does this represent Set A? Mark "yes" or "no."
[rectangle, circle, triangle], [triangle, rectangle, square], [square, clip, triangle]	4. Mark the picture of Set A.
[square, circle, triangle], [triangle, clip, square], [square, clip, circle]	5. Mark the one that represents Set A.
[square, triangle], [circle], [square, circle]	6. Mark the subset of Set a.
[rectangle, triangle], [circle, rectangle], [clip]	7. Mark the subset of Set A.

VISUAL	TEACHER COMMENTARY
[clip], [circle, rectangle], [square, triangle]	8. Mark the one that is not a subset of Set A.
triangle, rectangle, circle	9. Mark the one that is an element of Set A.
clip, square, rectangle	10. Mark the one that is not an element of Set A. (PUT AWAY SET A)
[triangles: dotted, black, plain] dotted square, plain circle, striped triangle	11. In your book you see a new set. Mark the picture that has a property that all the elements in this set must have.
[dotted: circle, square, rectangle] striped triangle, dotted rectangle, plain circle	12. Here is another set. Mark the picture that has a property that all the elements in this set must have.
[triangles: 2 plain, 1 black], [dotted: circle, square, rectangle] dotted triangle, black triangle, plain circle	13. Mark the element that goes in both sets.
(SAME SETS AS #13 INTERSECTING) plain triangle, dotted circle, dotted triangle	14. Here the two sets are overlapping. Mark the element that goes where the sets overlap.

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PROGRAM READING (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets Marking pens	Teacher reads written commentary and supervises booklet marking.

VISUAL			TEACHER COMMENTARY
			D. Word Discrimination Booklet
hat	cat	had	1. Look at these words. Mark the word "hat."
new	net	met	2. Look at these words. Mark the word "net."
pad	pat	mad	3. Look at these words. Mark the word "pad."
sam	mat	sat	4. Mark "sat."
man	rap	ran	5. Mark "ran."
lem	let	wet	6. Mark "let."
tan	ban	bat	7. Mark "ban."
and	ant	ind	8. Mark "and."
mat	pad	mad	9. Mark "mad."
bad	bat	sat	10. Mark "bad."
wen	let	wet	11. Mark "wet."
man	can	cat	12. Mark "can."
fhe	tho	the	13. Mark "the."
sit	hit	sim	14. Mark "sit."
pot	hot	hop	15. Mark "hot."

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PROGRAM MATRIX (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets Pencils	Teacher reads written commentary and supervises booklet marking.

<table>
<tr><th>VISUAL</th><th>TEACHER COMMENTARY</th></tr>
<tr><td></td><td>C. Matrix Booklet</td></tr>
<tr><td>Chair, matrix, nonsense picture</td><td>1. Mark the matrix.</td></tr>
<tr><td>Matrix cell, circles, triangles</td><td>2. Mark a cell.</td></tr>
<tr><td>Column, row, diagonal</td><td>3. Mark the row of chairs.</td></tr>
<tr><td>Diagonal, column, row</td><td>4. Mark the column of lamps.</td></tr>
<tr><td>House, house, house</td><td>5. Mark the first house.</td></tr>
<tr><td>Ball, ball, ball</td><td>6. Mark the third ball.</td></tr>
<tr><td>Shoe, shoe, shoe</td><td>7. Mark the second shoe.</td></tr>
<tr><td><table><tr><th></th><th>chair</th><th>bed</th></tr><tr><td>X girl</td><td></td><td></td></tr><tr><td>X boy</td><td></td><td></td></tr></table></td><td>8. Mark a row clue.</td></tr>
<tr><td><table><tr><th></th><th>dress X</th><th>hat X</th></tr><tr><td>flower</td><td></td><td></td></tr><tr><td>bow</td><td></td><td></td></tr></table></td><td>9. Mark a column clue.</td></tr>
<tr><td>Row 1 clue, row 2 clue</td><td>10. Here is an empty matrix. Pretend we want to fill in the matrix. Mark the first clue you should look at.</td></tr>
<tr><td>Column 1 clue, column 2 clue</td><td>11. Draw a circle around the second clue you should look at.</td></tr>
</table>

<table>
<tr><th>VISUAL</th><th>TEACHER COMMENTARY</th></tr>
<tr><td>
<table>
<tr><th></th><th>table</th><th>mat</th></tr>
<tr><td>lamp</td><td>lamp on table</td><td>lamp on mat</td></tr>
<tr><td>book</td><td></td><td>book on mat</td></tr>
</table>
Vase on table, book on table, book on chair
</td><td>13. One of the cells in this matrix is empty (POINT). Now look at the bottom of the page. Mark the picture that goes in the empty cell.</td></tr>
<tr><td>
<table>
<tr><th></th><th>cat</th><th></th></tr>
<tr><td>bow</td><td>bow on cat</td><td>bow on dog</td></tr>
<tr><td>hat</td><td>hat on cat</td><td>hat on dog</td></tr>
</table>
Horse, bow, dog
</td><td>14. One of the clues is missing. Now look at the bottom of the page. Mark the missing clue.</td></tr>
<tr><td>
<table>
<tr><th></th><th>at</th><th>an</th></tr>
<tr><td>p</td><td></td><td></td></tr>
<tr><td>f</td><td></td><td></td></tr>
</table>
pat, fat, pan
</td><td>15. Mark the word that goes in the first cell in row one.</td></tr>
</table>

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PROGRAM SOCIAL STUDIES (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets Marking pens	Teacher reads written commentary and supervises booklet marking.

VISUAL	TEACHER COMMENTARY
	A. Social Studies Booklet
Globe	1. Put a mark on the warmest part of the earth.
Globe	2. Put a mark on the coldest part of the earth.
African, Eskimo, Caucasian	3. Mark the boy that lives in Alaska.
African, Eskimo, Caucasian	4. Mark the African boy.
House, igloo, hut	5. Mark the hut.
House, igloo, hut	6. Mark the house Eskimo boys live in.
Dugout, kyack, blimp	7. Mark the boat they use in Alaska.
Walrus, puffin, salmon	8. Mark the walrus.
Sandals, mukluks, snowshoes	9. Mark the mukluks.
Agbada, parka, jacket	10. Mark the agbada.
Ice hole, river bank, boat	11. Mark the way they fish in Alaska.
Dogsled, kyack, bicycle	12. Mark a way people get from place to place in Africa.
Basket on back, dogsled, kyack	13. Mark the way they carry packages in Africa.
Agbada, mukluks, parka	14. Mark the parka.
Yams, bananas, salmon	15. Mark a food Eskimos eat in Alaska.
Apples, bananas, carrots	16. Mark the fruit that grows in Africa.
Dugout, kyack, blimp	17. Mark the boat used on the rivers in Africa.

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UCLA EARLY CHILDHOOD LANGUAGE PROGRAM: TEST BATTERY
(First Grade)

PROGRAM LOGIC/MATRIX (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets, Marking Pens, Blocks, Spinners, Cards	Teacher reads written commentary, presents blocks, spinners, cards, and supervises booklet marking.

VISUAL	TEACHER COMMENTARY
Bird yes no ?	1. (POINT) This word says "yes," this word says "no," and this is a sign that means " we don't know," "we can't tell." (POINT) Is this bird's name Dickie bird? (PAUSE) We don't know. Mark the "don't know" sign like this (DEMONSTRATE). Turn the page.
Elephant holding pail yes no ?	2. Is the elephant holding a pail? (POINT) Remember, this says "yes," this says "no," and this says "can't tell." Mark the answer. Turn the page.
Closed truck yes no ?	3. Are there toys in the truck? Mark the answer.
Opaque sprinkling can yes no ?	4. Lisa waters the flowers with this can. Does the can have water in it now? Mark the answer.
Boy climbing stairs yes no ?	5. Is Jimmy going upstairs? Mark the answer.
	Now we're going to play the "yes," "no" and "can't tell" game with blocks.
"All blue" block yes no ?	6. (ROTATE IN HAND SO CHILD SEES ALL SIDES) This block has ALL blue sides. If I throw this block will there be a blue side on top? Mark the answer.
"Some blue" block yes no ?	7. (ROTATE BLOCK) This block has SOME blue sides. If I throw this block will there be blue on top? Mark the answer.

VISUAL	TEACHER COMMENTARY
"No blue" block yes no ?	8. (ROTATE BLOCK) Here is a block with NO blue sides. If I throw this block will there be blue on top? Mark the answer.
Pink cards: Clowns Green cards: Kite, mouse, basket, chair Purple cards: Clown, shoe, flower, fish	Here's a different game. Look at these cards (SHOW BLANK SIDE OF ALL CARDS, SPREAD THEM OUT. CARDS WITH SAME COLOR SHOULD BE FANNED OUT TOGETHER). All the cards have pictures on the other side (TURN CARDS OVER, SPREAD THEM SO THAT CHILDREN HAVE GLIMPSE OF PICTURE). Here are some clowns, a kite, a basket, and other pictures. (PICK UP CARDS, TURN OVER SO PICTURES ARE NOT VISIBLE)
Pink card yes no ?	9. Listen carefully and mark "yes," "no," or "can't tell." ALL the pink cards have clowns on them. (POINT) Does this pink card have a clown on the other side? Mark the answer.
Green card yes no ?	10. NONE of the green cards have clowns on them. (POINT) Does this green card have a clown on the other side? Mark the answer.
Purple card yes no ?	11. SOME of the purple cards have clowns on them. (POINT) Does this purple card have a clown on the other side? Mark the answer.
Spinners: "Some stripes," "all stripes," "no stripes"	(HOLD UP SPINNER CARD AND SPIN) These are spinners. You have a picture of three spinners on the blue page. 12. Now I ALWAYS want to get stripes. Mark the spinner I should use to always get stripes.
"Some stripes," "all stripes," "no stripes"	13. Now I NEVER want to get stripes. On the pink page mark the spinner I should use to never get stripes.
"Some stripes," "all stripes," "no stripes"	14. Now I SOMETIMES want to get stripes. On the white page mark the spinner I should use to sometimes get stripes.
Column, row, diagonal	Now we're going to do something different. 15. Mark the row of chairs.
Diagonal, column, row	16. Mark the column of lamps.
(SAME AS #8, page 40)	17. Mark a row clue. (GIRL OR BOY)

VISUAL	TEACHER COMMENTARY
(SAME AS #9, PAGE 40)	18. Mark a column clue. (DRESS OR HAT)

	fishbowl	box
fish	fish in bowl	
turtle	turtle in bowl	turtle in box

Fish, fish in box, turtle in box

19. Look at the pictures below the line. One of these pictures belongs in the empty cell. Mark it.

VISUAL	TEACHER COMMENTARY
(SAME AS #13, PAGE 41)	20. Mark the picture that goes in the empty cell.
(SAME AS #14, PAGE 41)	21. One of the clues is missing. Now look at the bottom of the page. Mark the missing clue.

	ot	ap
r	rot	rap
	not	nap

r p n a

22. Mark the missing clue.

	at	an
c		can
m	mat	

cat, man

23. Here is a matrix with the row and column clues. Fill in the two empty cells.

VISUAL	TEACHER COMMENTARY
(SAME AS #15, PAGE 41) pat, pan, fat, fan	24. Here is a matrix with the row and column clues. Fill in all the cells.

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PROGRAM SETS (GROUP)

MATERIALS:	GENERAL PROCEDURE:
Student Booklets, Pencils, Set Card A	Teacher reads written commentary, presents set card, and supervises booklet marking.

VISUAL	TEACHER COMMENTARY
Set Card A: [square, triangle, paperclip]	(POINT TO CARD) Look at my card. This is a set. We call this Set A. Now look at page one in your booklet.
(SAME AS #4, PAGE 37)	1. Draw a line through the picture of Set A. Turn the page.
(SAME AS #5, PAGE 37)	2. Mark the one that represents Set A.
(SAME AS #6, PAGE 37)	3. Mark the subset of Set A.
(SAME AS #7, PAGE 37)	4. Mark the subset of Set A.
(SAME AS #9, PAGE 38)	5. Mark the one that is an element of Set A. (PUT AWAY CARD)
(SAME AS #11, PAGE 38)	6. Look up here. On this page there is a new set (POINT). Mark the one below the line (POINT) that shows a property all elements in this set must have.
(SAME AS #12, PAGE 38)	7. Here is another set (POINT). Mark the one below the line (POINT) that shows a property all elements in this set must have.
(SAME AS #13, PAGE 38)	8. Mark the element that could go in either set.
(SAME AS #14, PAGE 38)	9. Here the two sets are overlapping. Mark the element that goes where the sets overlap.
[circles: 1 black, 2 plain] intersecting [stripes: triangle, oval, square] Striped circle, plain triangle, plain circle	10. Here are two more overlapping sets. Mark the element that goes where the sets overlap.
[circles: dotted, plain; triangles: striped, plain; squares: dotted, striped]	11. Look up here and watch me. Here's a set. Draw a line around the elements that make a subset of triangles like this (DEMONSTRATE AND (CHECK). Now you draw a line to make a subset of circles.

VISUAL	TEACHER COMMENTARY
(SAME AS #11, PAGE 46)	12. Make a stripe subset. (STRIPED TRIANGLE, STRIPED SQUARE)
(SAME AS #11, PAGE 46 PLUS ELEMENT OUTSIDE SET:) Plain square	13. Look up here. (POINT TO SQUARE OUTSIDE SET) Here is an element. Make a subset that would include this element. (THREE SQUARES)
(SAME AS #13 ABOVE)	14. Here is the same set. Make a different subset for this element. (TRIANGLE, CIRCLE, SQUARE: ALL BLANK) (#13, #14: ANSWERS INTERCHANGEABLE)
(SAME AS #11, PAGE 46) Striped triangle, dotted square, striped circle, plain triangle	15. Below the line mark one element which is in both the triangle and the stripe subsets.

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INDIVIDUAL TESTS

A. PICTURE READING

Same as Picture Reading, page 1.

1970 Revised Scoring

1. One point for each grammatically complete sentence. If sentences have been joined together with conjunctions they count as separate sentences.
2. One point for continuity between pictures.
3. One point for relevant description of action.

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B. PARALLEL SENTENCE PRODUCTION TEST

Same as Parallel Sentence Production Test, pages 2-3.

1970 Revised Instructions

Now we are going to do something different. I'm going to make a sentence about one picture and I want you to make the same kind of sentence for the other picture. Like this:

A. (POINT TO LEFT PICTURE) I'll say: "This cat is playing with a ball." (POINT TO RIGHT PICTURE) You say: "This dog is playing with a bone." Go ahead. You say it...
(IF CORRECT, REINFORCE RESPONSE. DO NOT PROCEED UNTIL CHILD ATTEMPTS SENTENCE.)

B. Now let's try this one. (POINT TO LEFT) I say: "The little boy is riding a little bike."
(POINT TO RIGHT) Now you.
(IF CHILD PRODUCES PARALLEL SENTENCE, SAY:) That's good! You've got the right idea! Let's try the next one. (PROCEED THROUGH TEST)
(IF CHILD DOES NOT PRODUCE PARALLEL SENTENCE SAY:) The big boy is riding a big bike. Now you say it.

(IF AT ANY TIME DURING THE TEST THE CHILD STARTS TELLING EXTENSIVE STORIES WITHOUT MAKING A PARALLEL SENTENCE, SAY: "REMEMBER, YOU MAKE THE SENTENCE ABOUT YOUR PICTURE THE SAME AS MY SENTENCE ABOUT MY PICTURE." BE SURE CHILD KNOWS HE IS TO MAKE UP PARALLEL SENTENCES AND NOT JUST "TELL A STORY.")

1970 Revised Scoring

1. One point is given for each grammatically complete sentence.
2. One point for each word (except "a") identical to the one on the answer sheet. The following substitutions are given credit: the=this=that; these=those; sleeping=resting; small=little; skinny=thin; lady=woman; on=in; monkeys=apes=gorillas; water=sea=ocean; carrying=holding; sits=stays; day=morning; outdoors=outside. No credits are given for words used in addition to those required. Pronouns may not be credited instead of a required noun.